

# THE IRON AGE

A Review of the Hardware, Iron and Metal Trades.

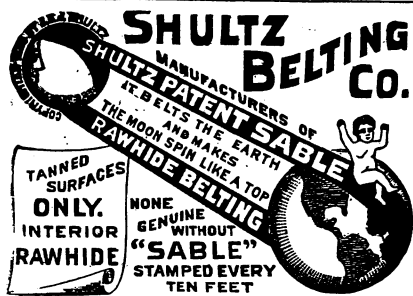
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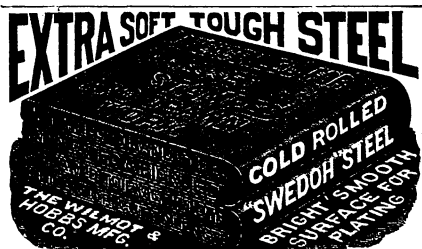
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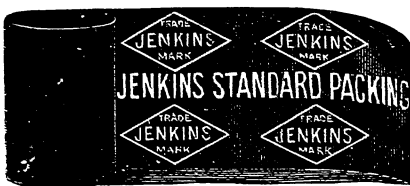
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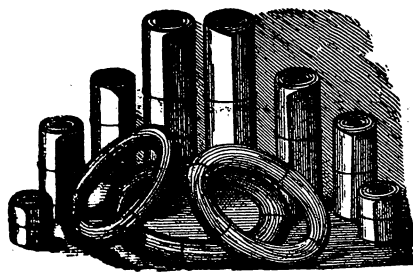
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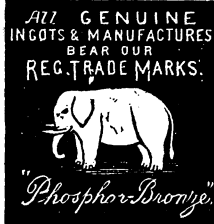
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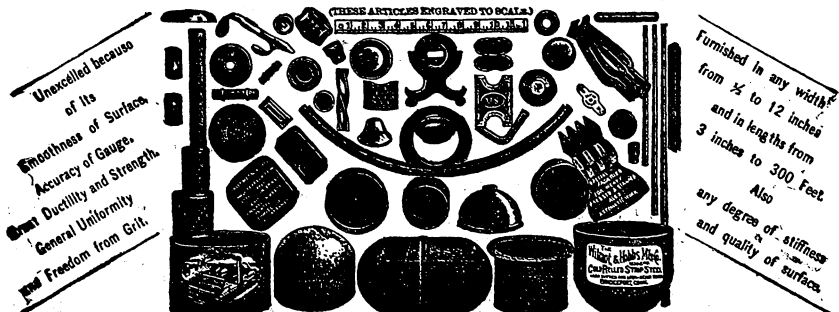
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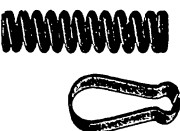
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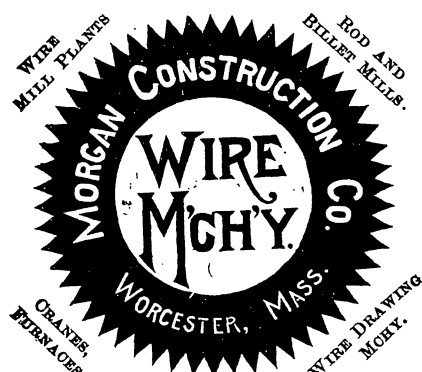
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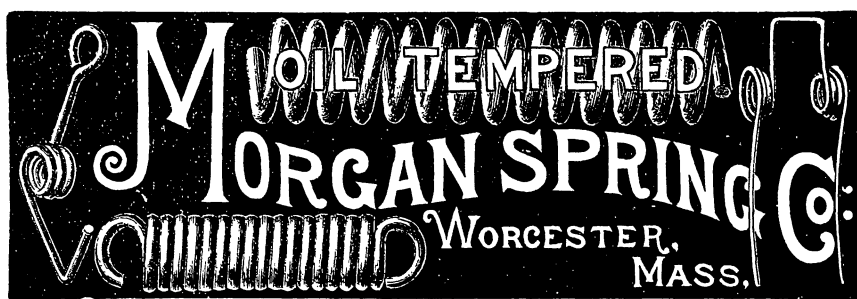
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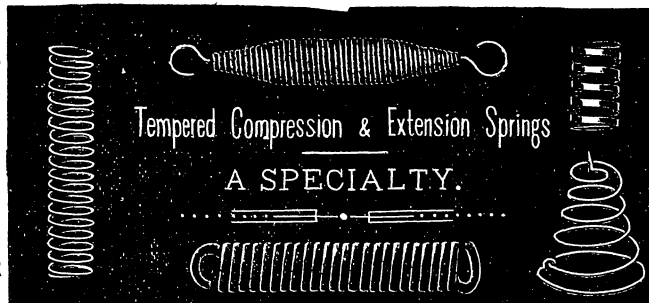
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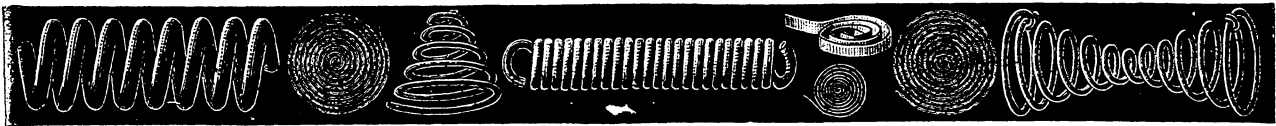
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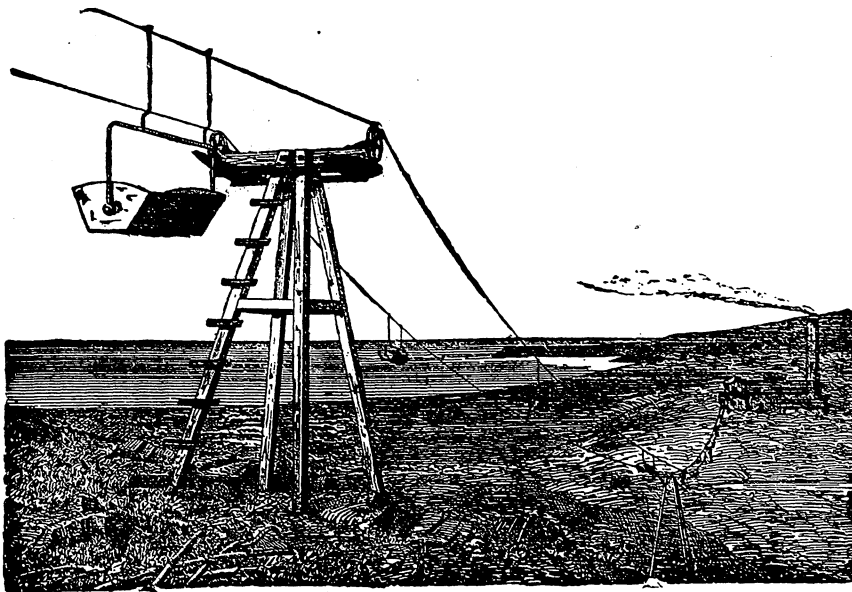
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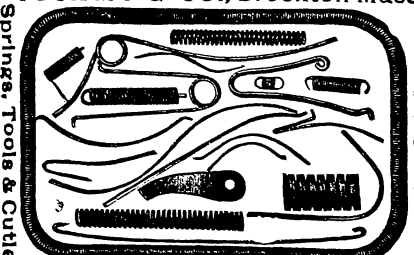
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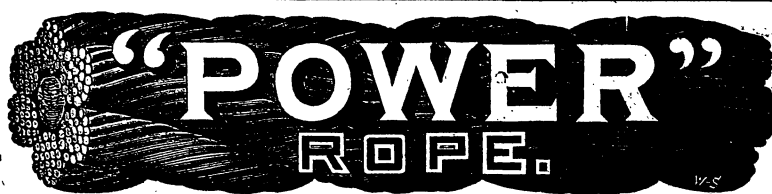


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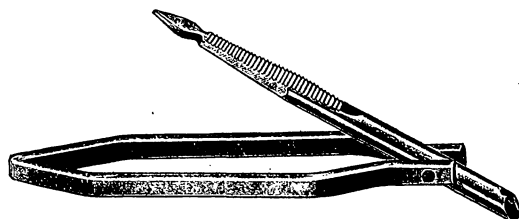
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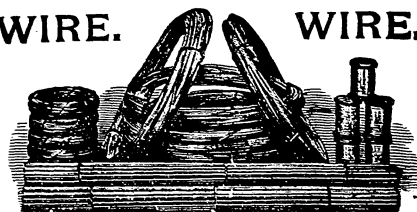
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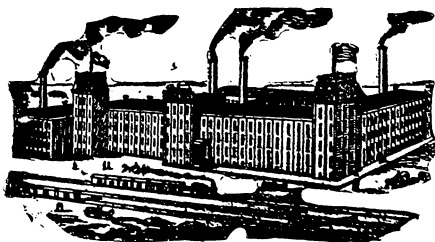
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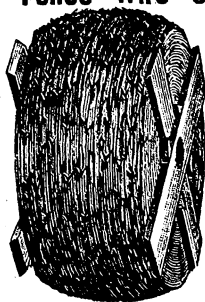
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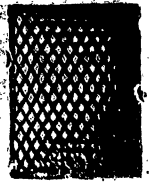


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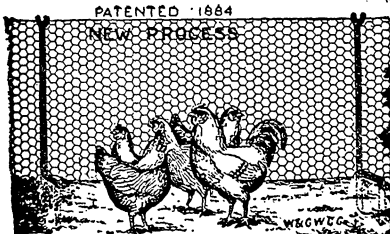
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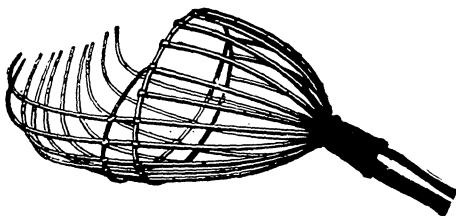
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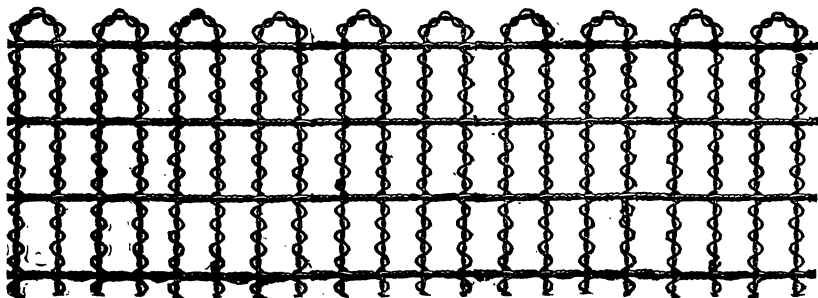
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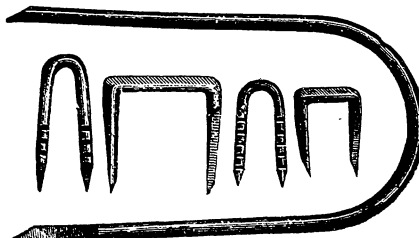


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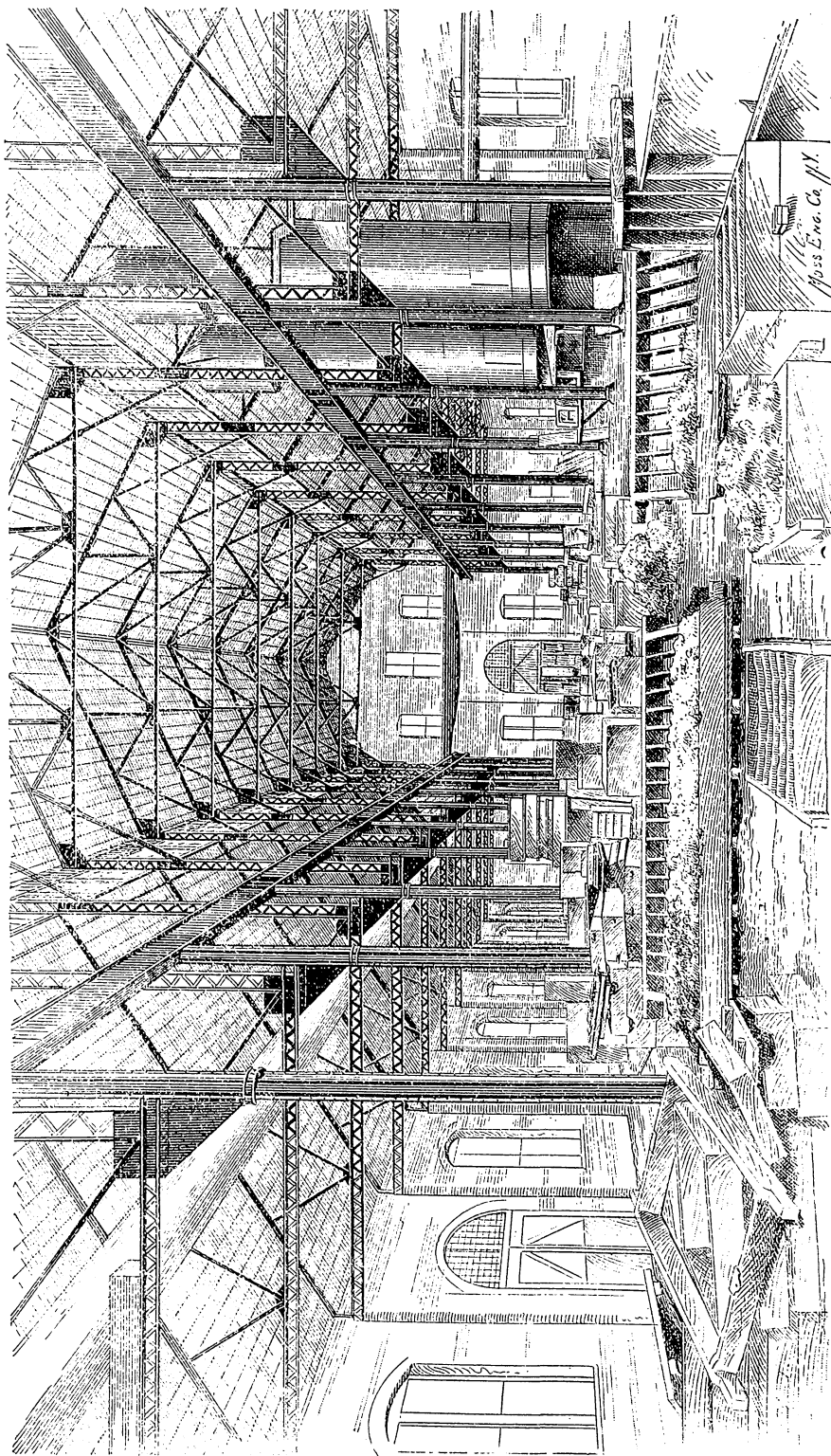
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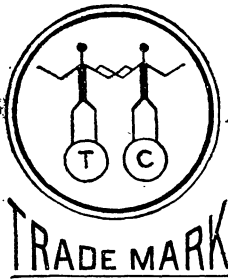
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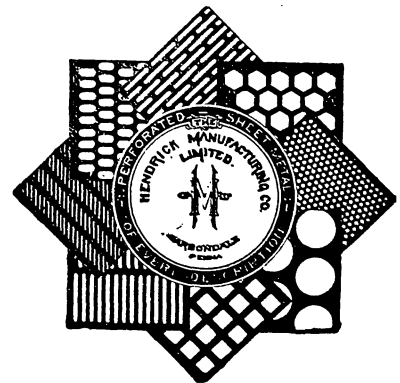
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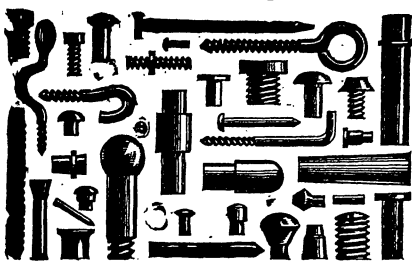
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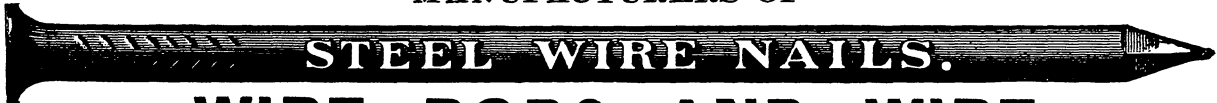
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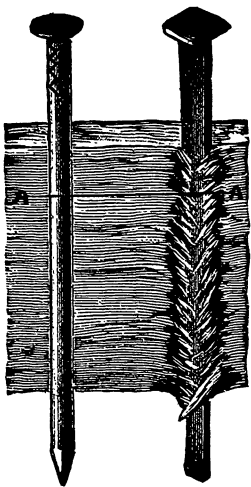
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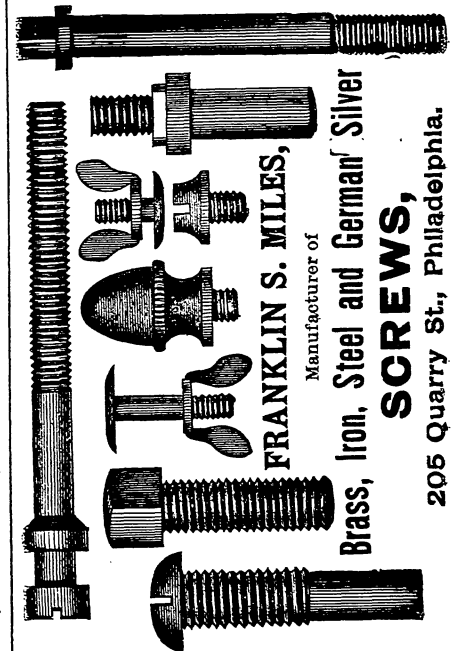
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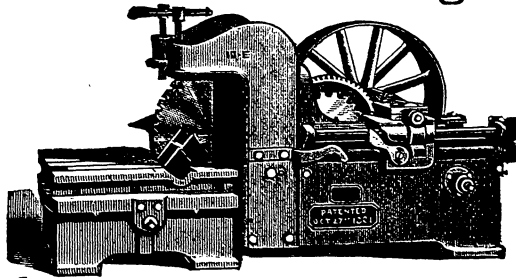
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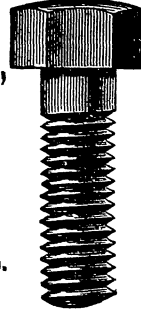
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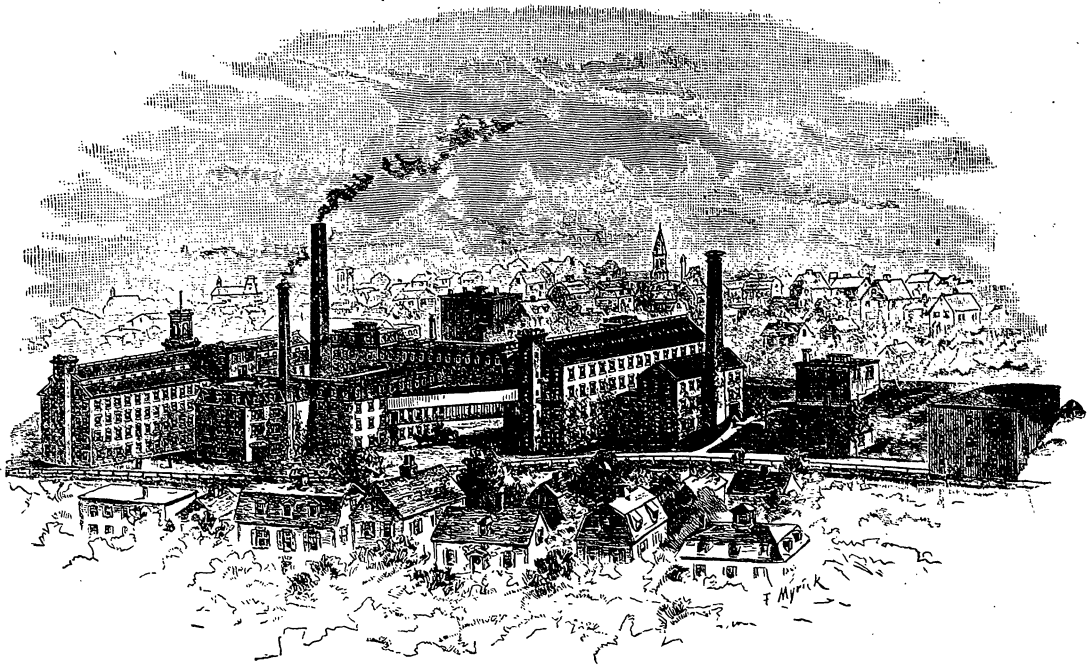
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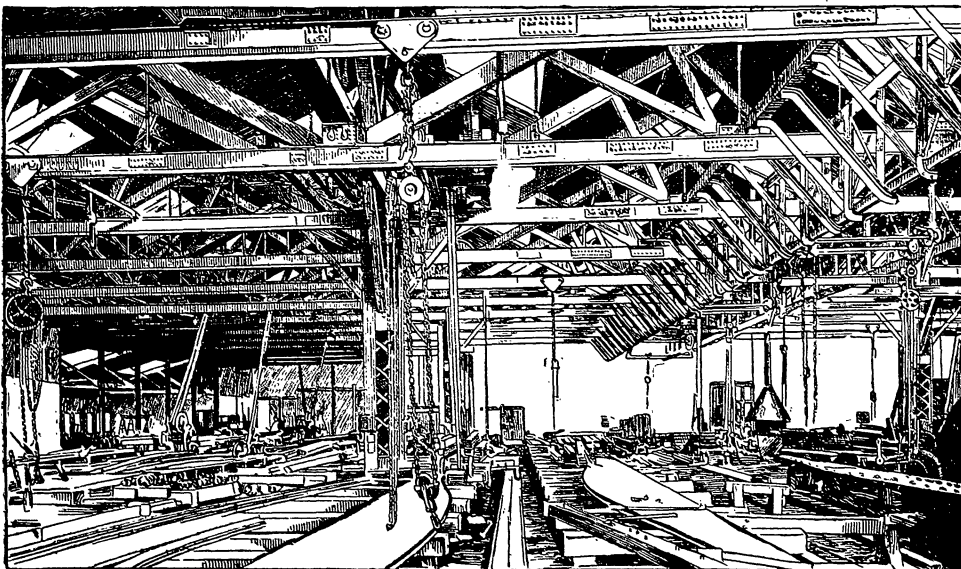
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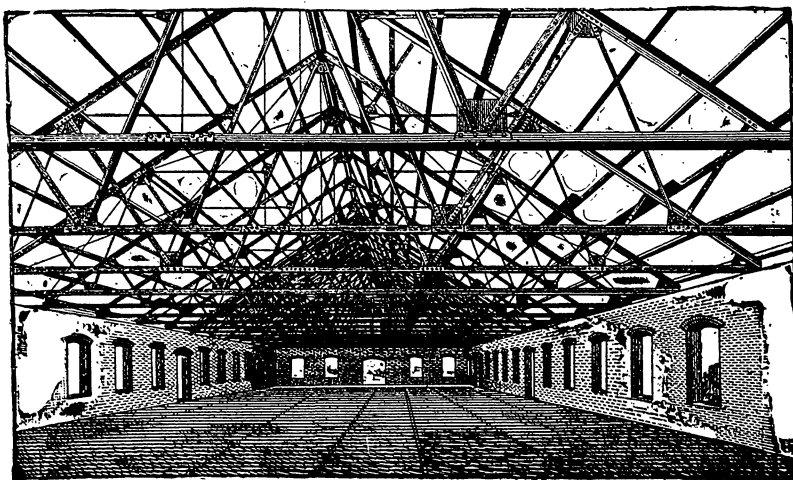
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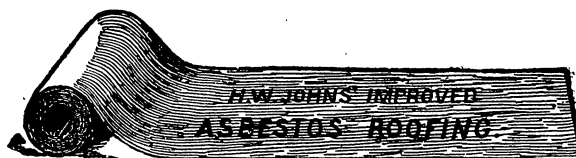


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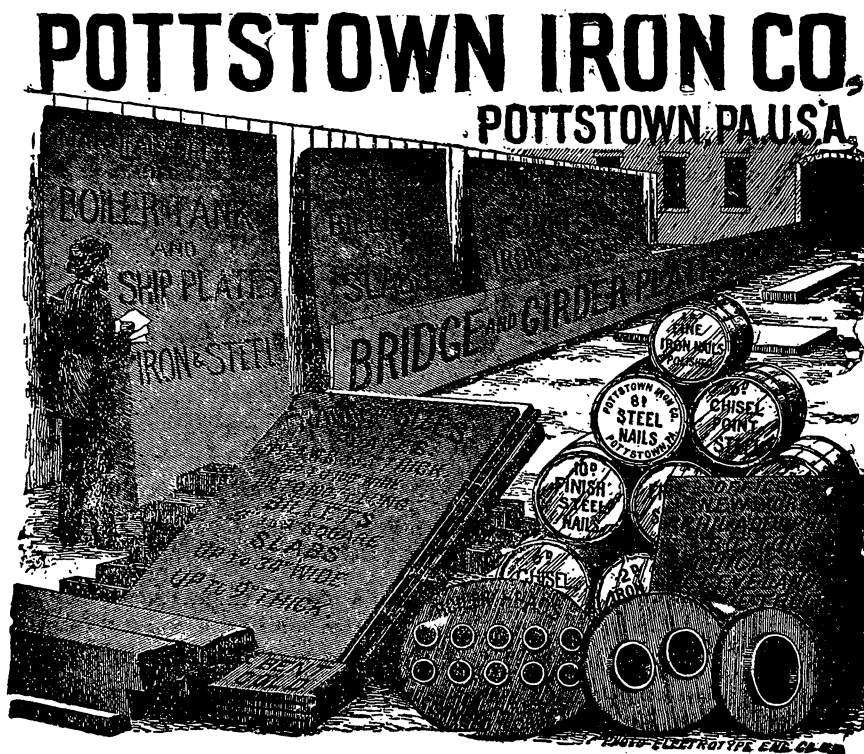
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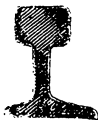
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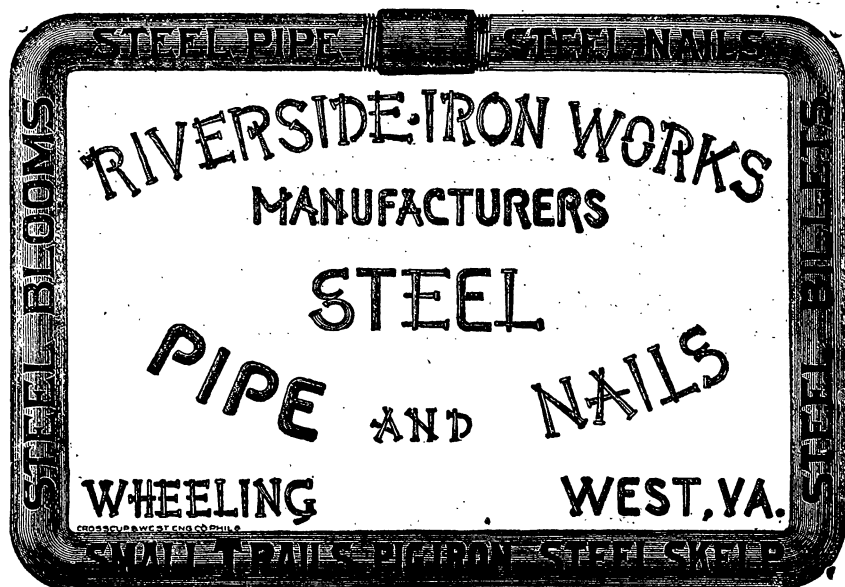
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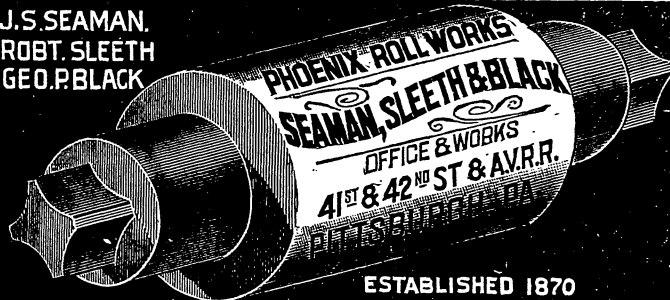
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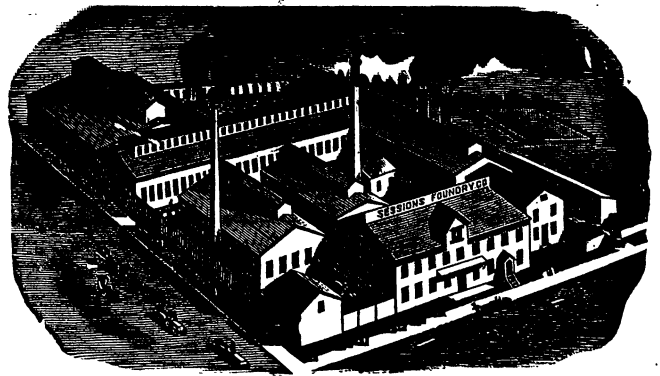
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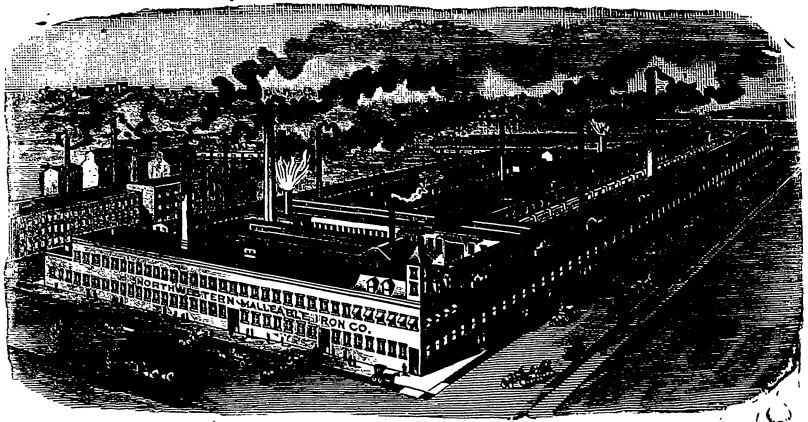
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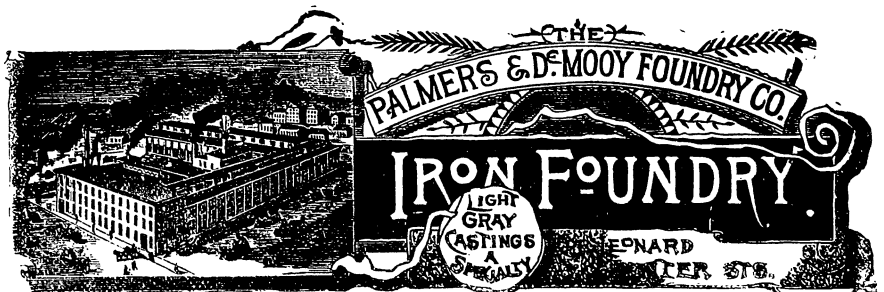
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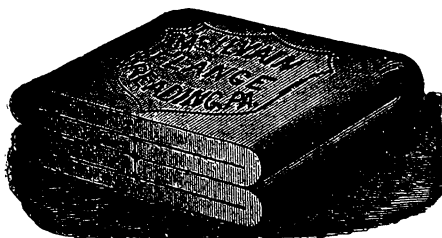
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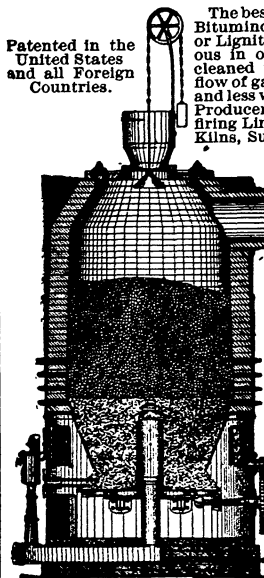
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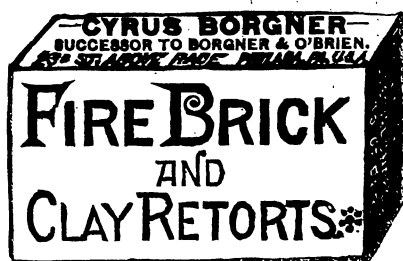
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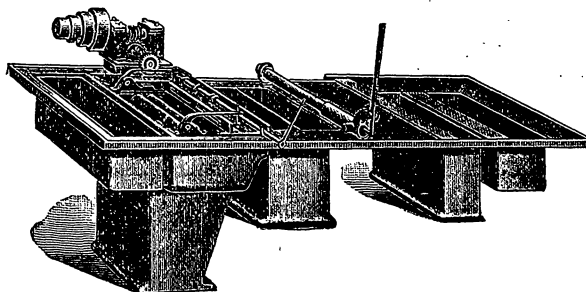
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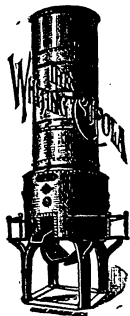
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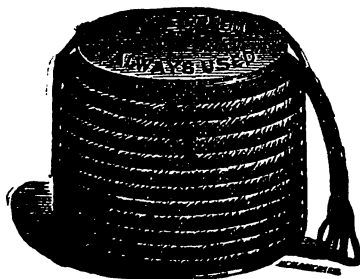
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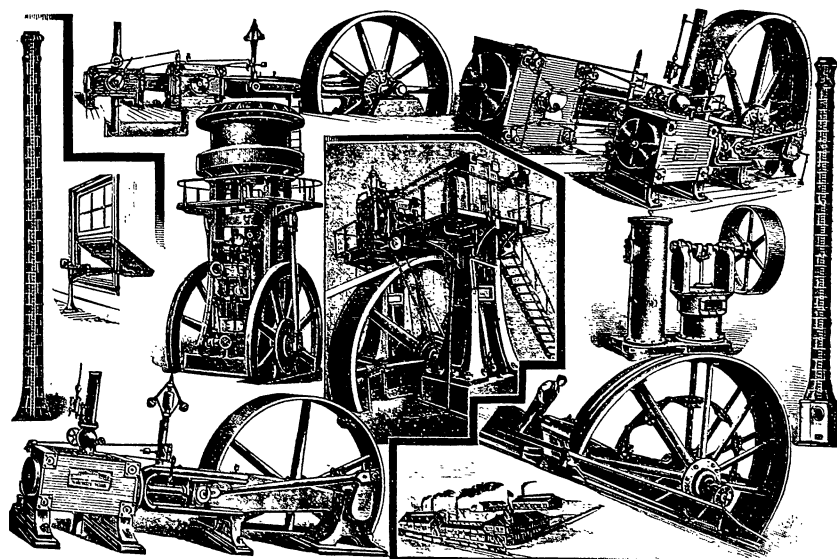
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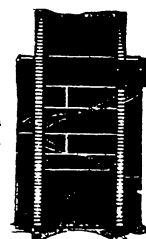
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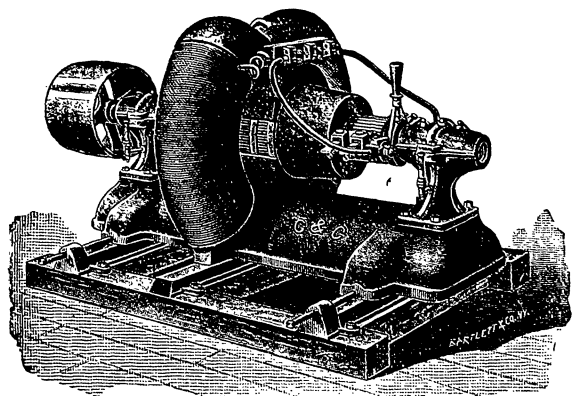
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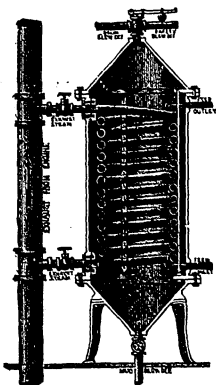


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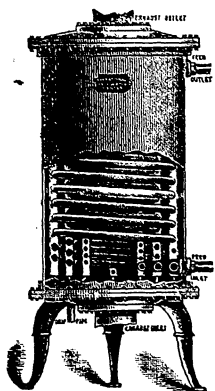
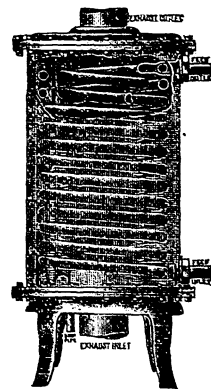
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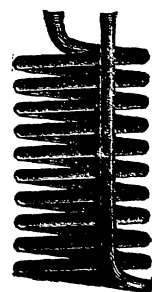


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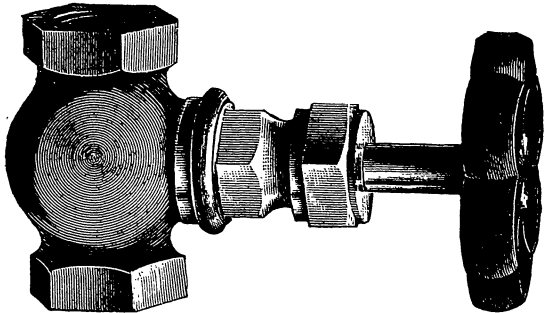
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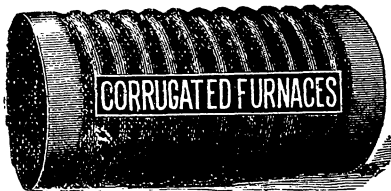
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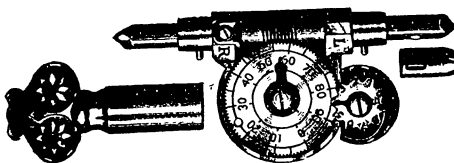
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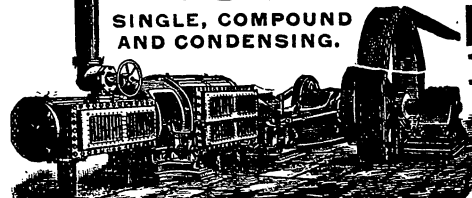
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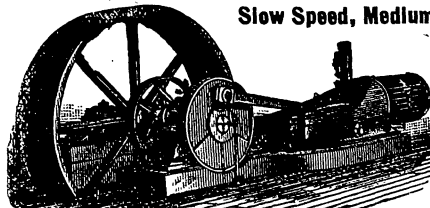


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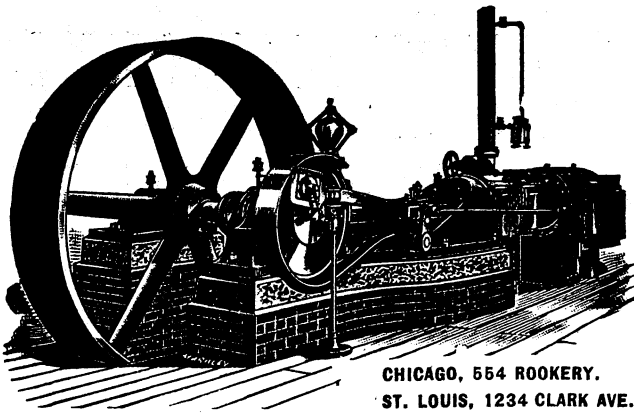


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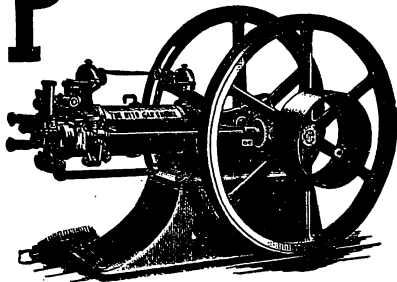
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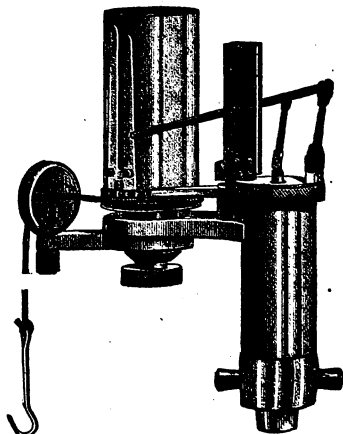


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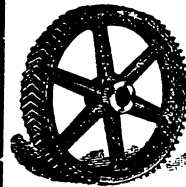
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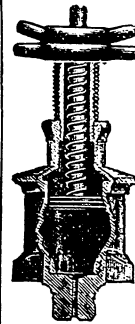
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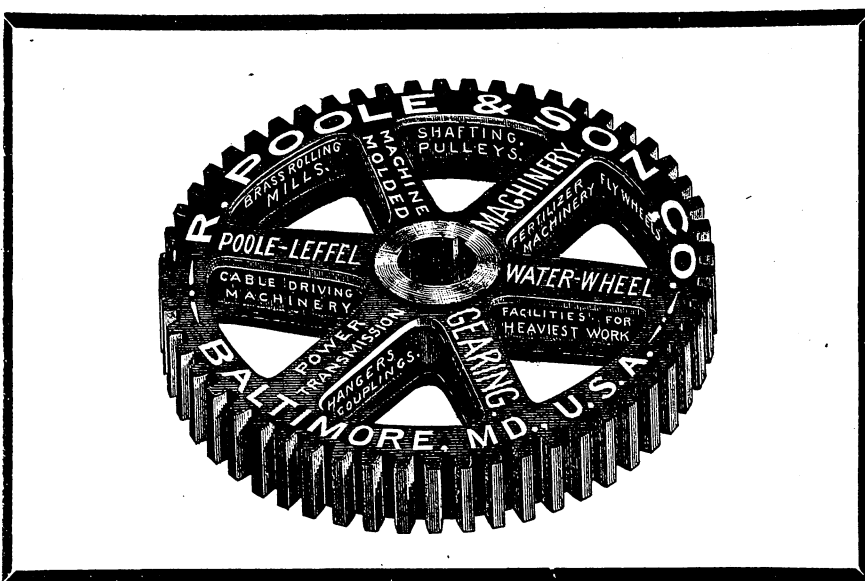
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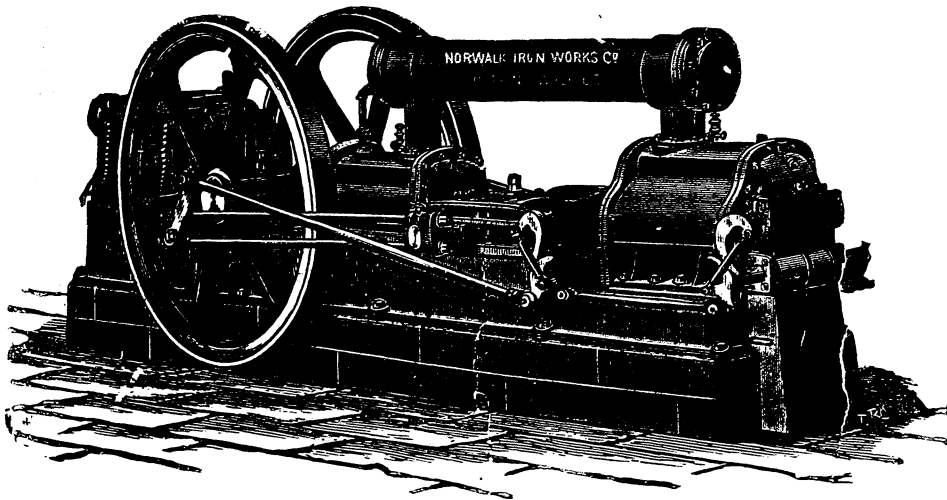
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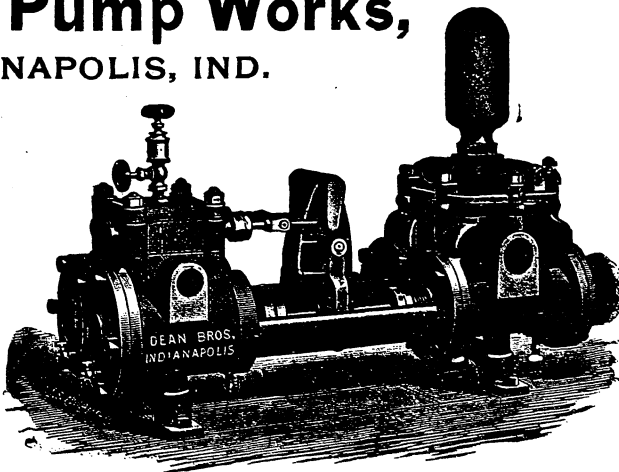
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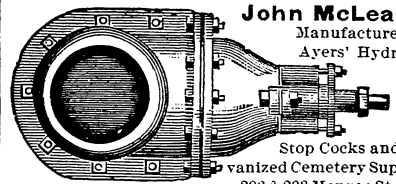
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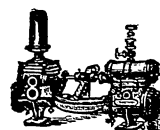
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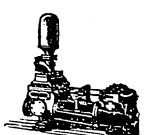
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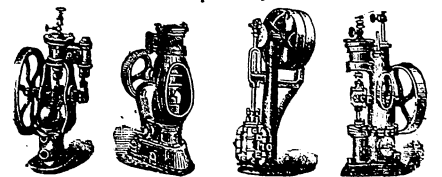
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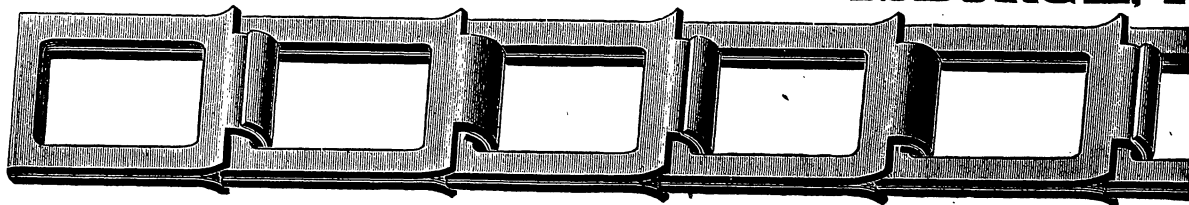
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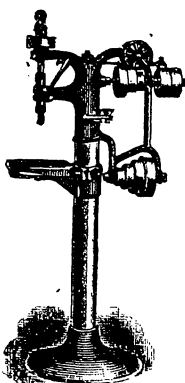
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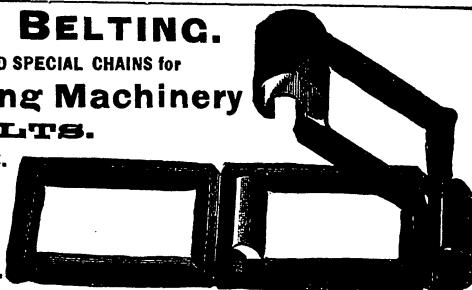
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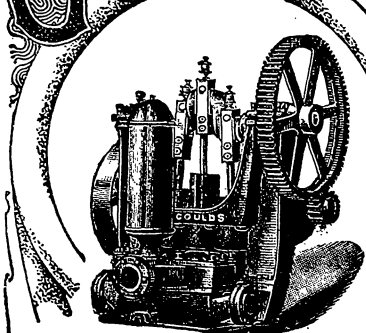
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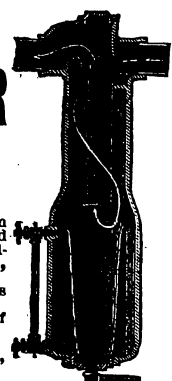
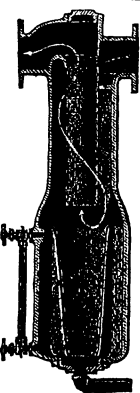
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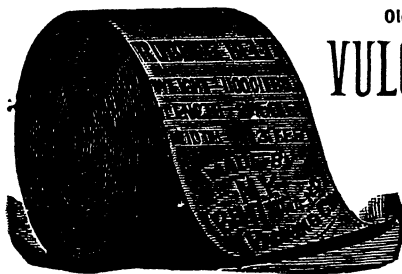
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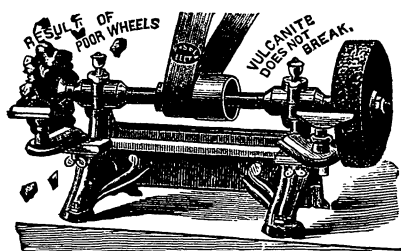
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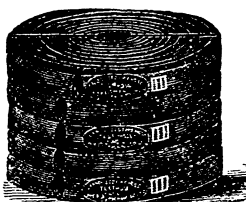
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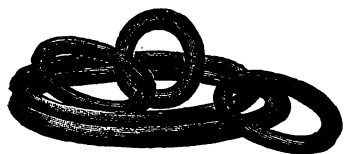
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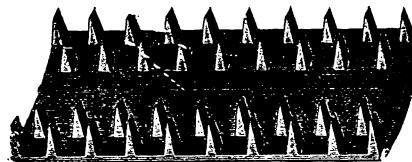
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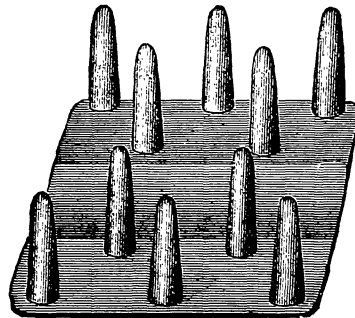
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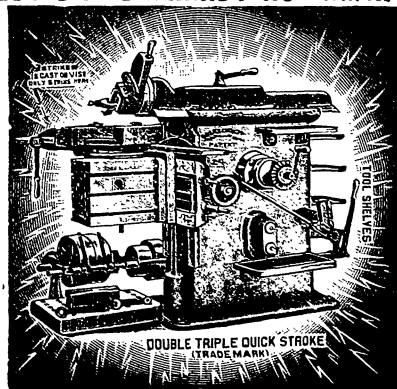
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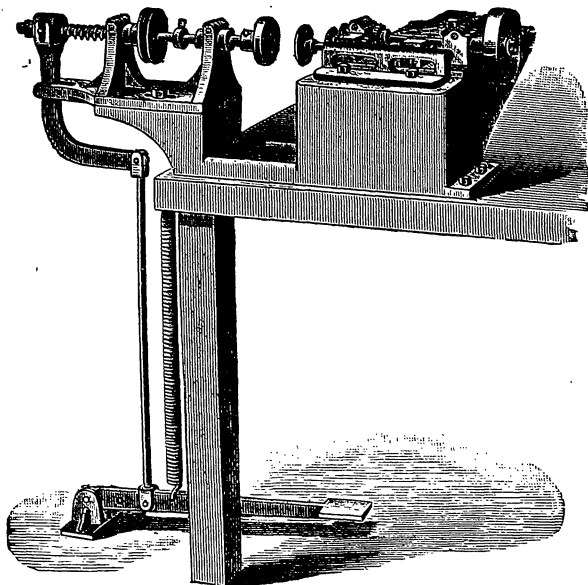
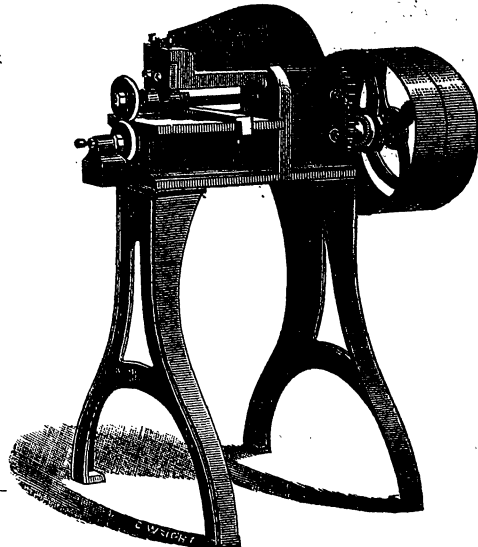
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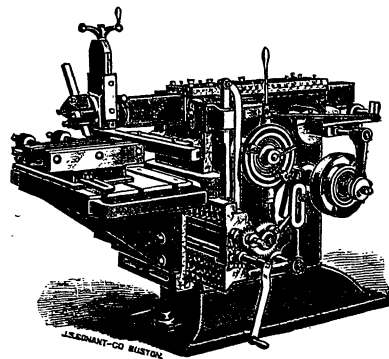
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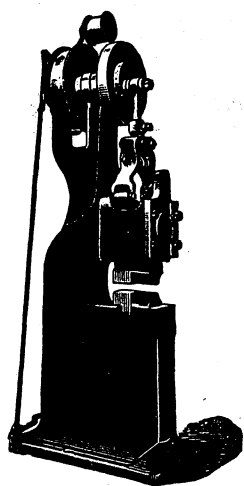
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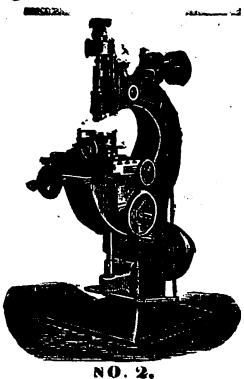
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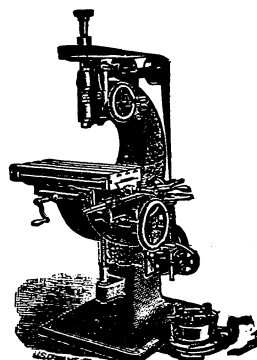
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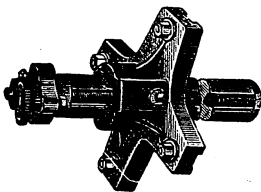
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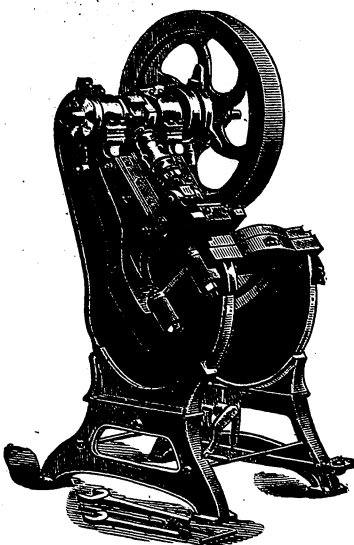
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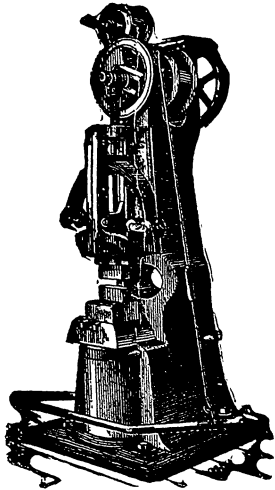
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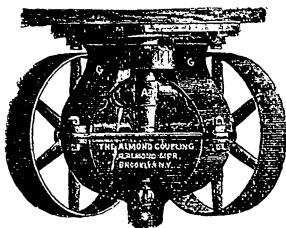
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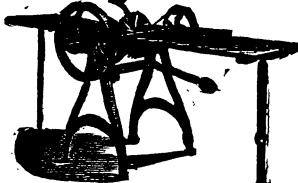
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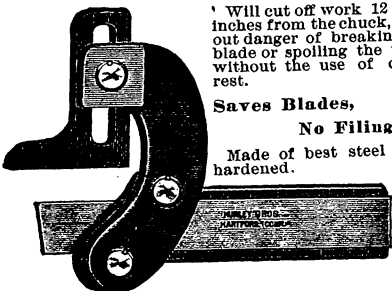
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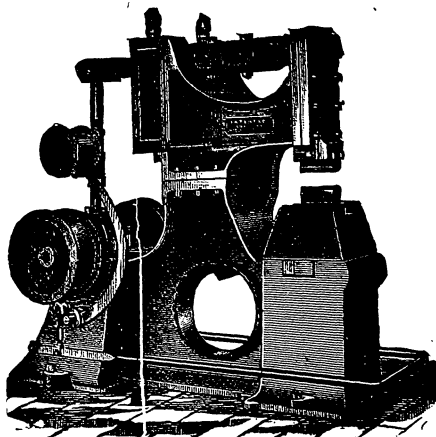
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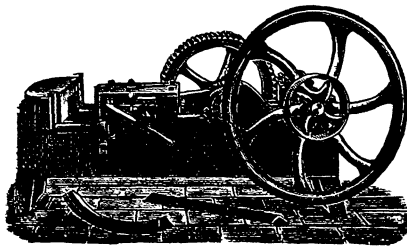
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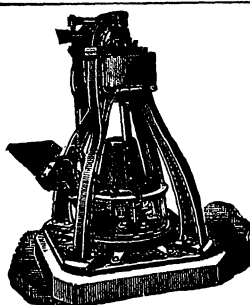
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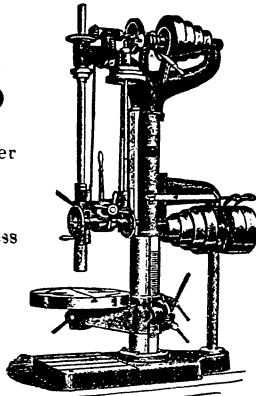
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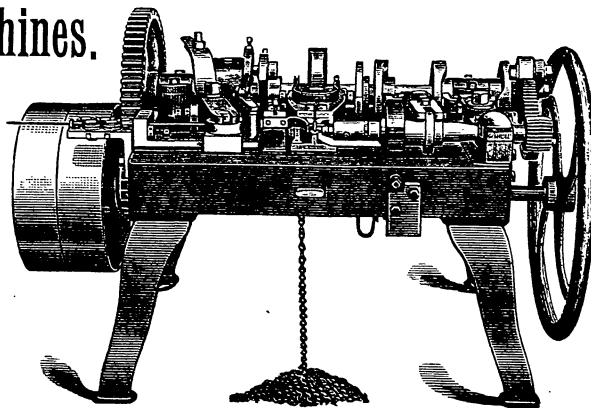
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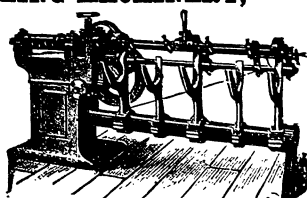
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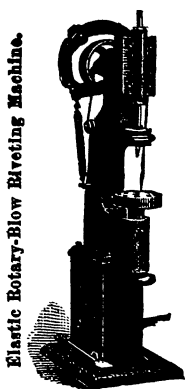
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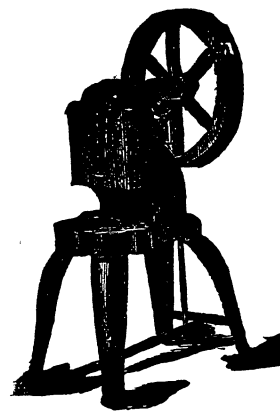
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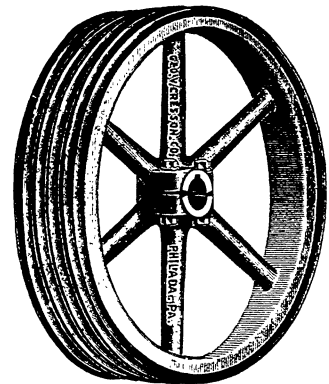
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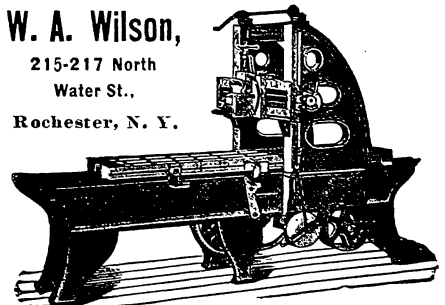
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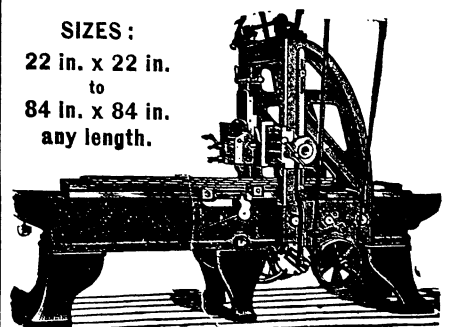
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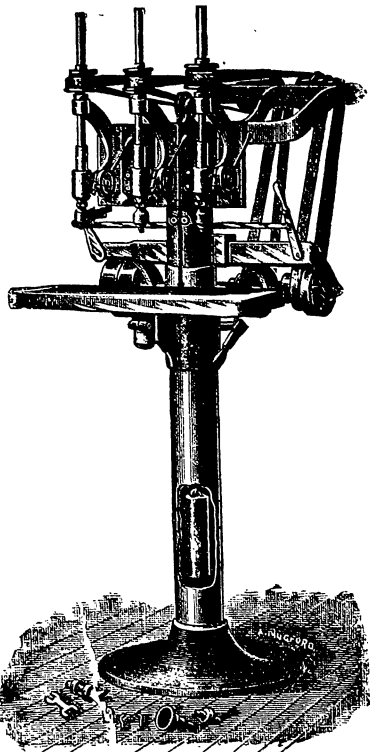
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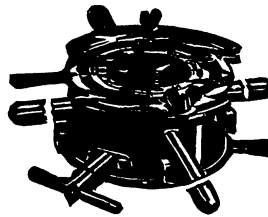
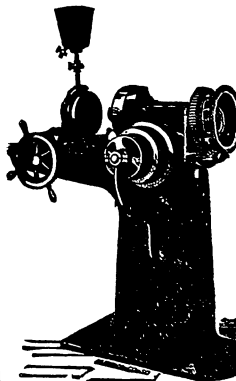
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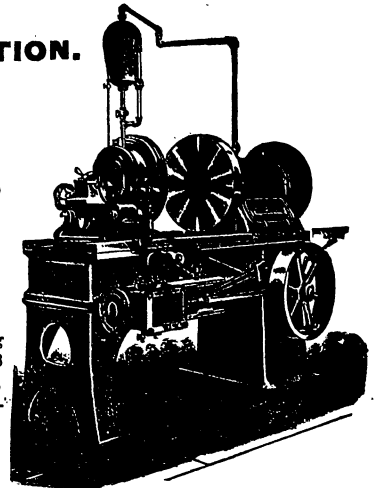
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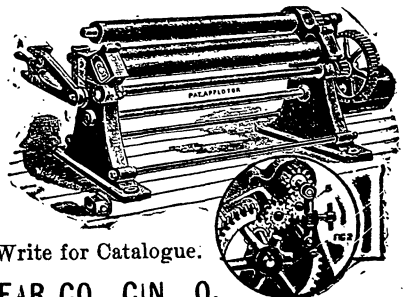
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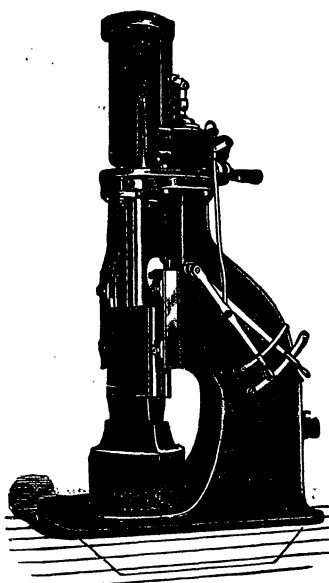
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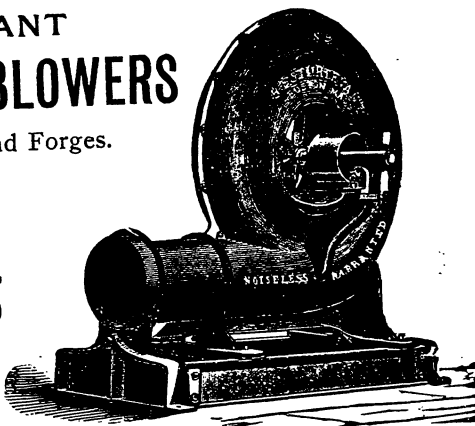
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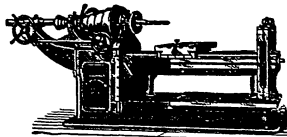
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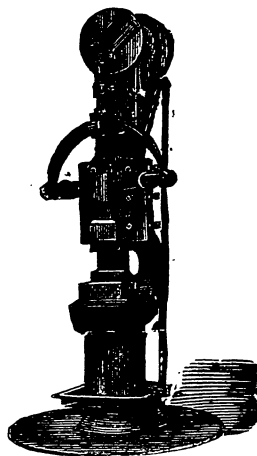
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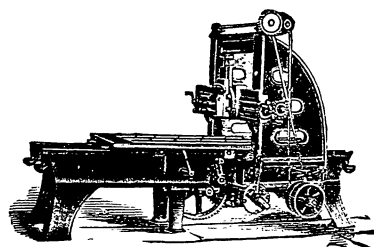


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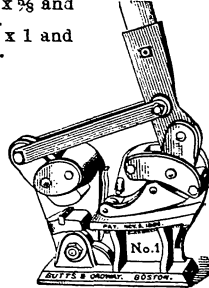
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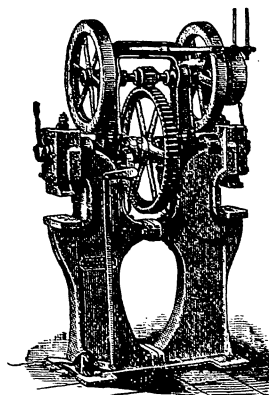
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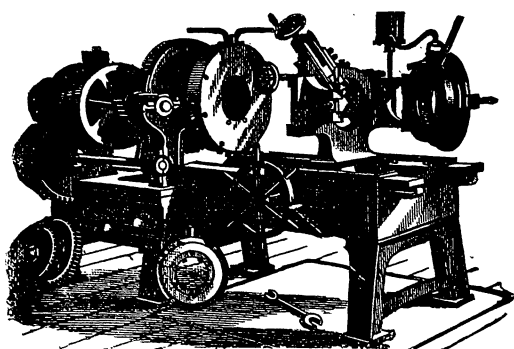
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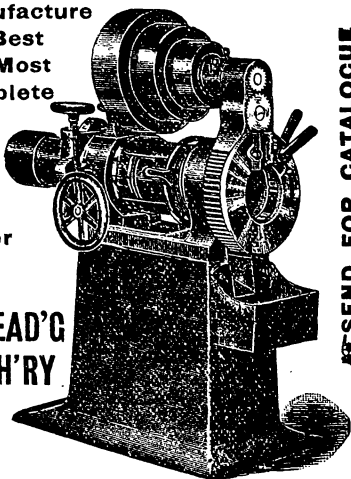
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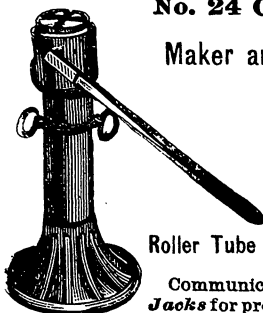
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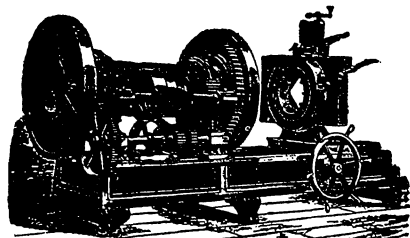
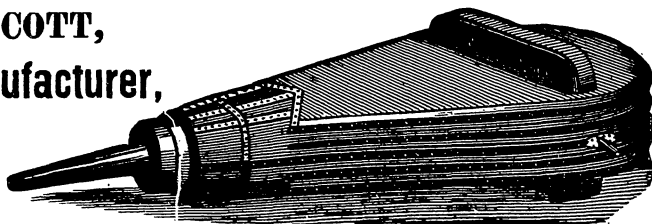
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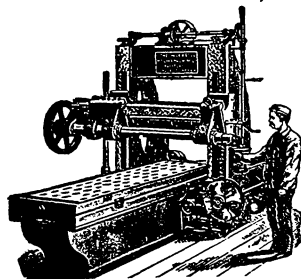
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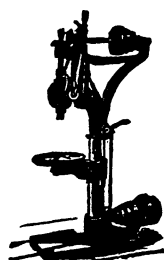
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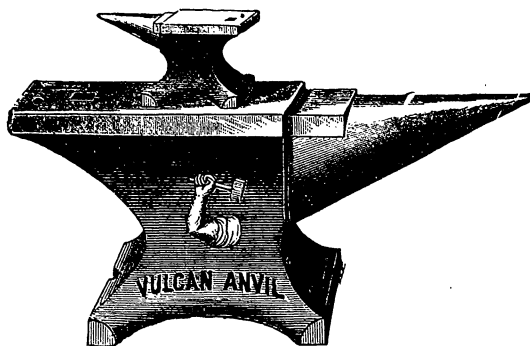
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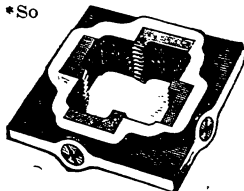
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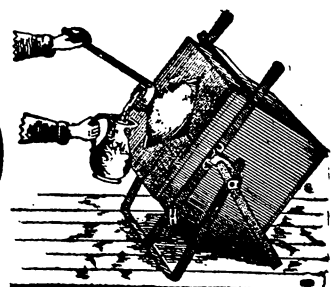
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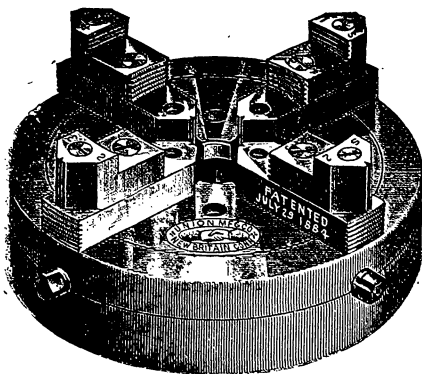
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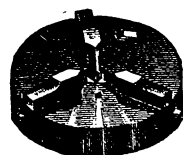
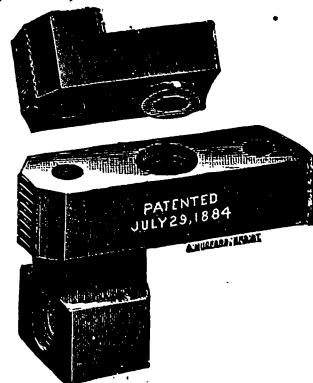
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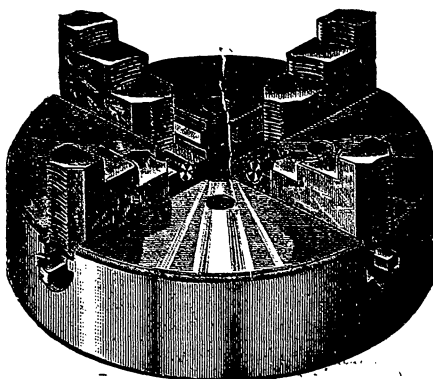
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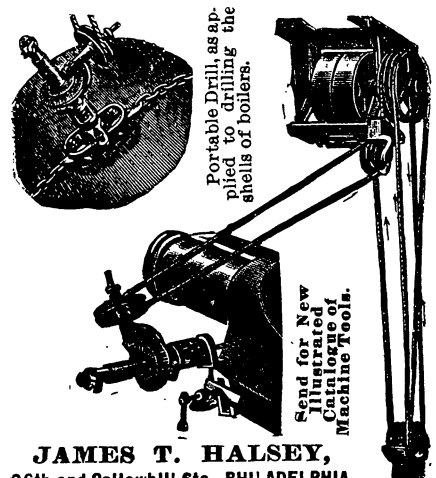
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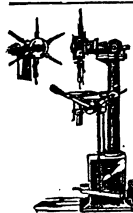


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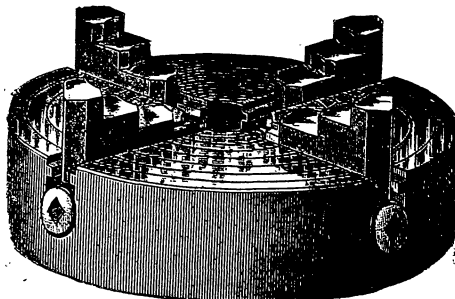
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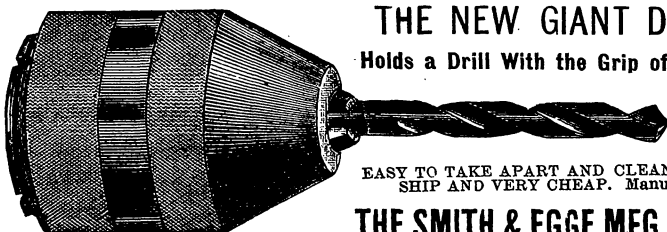


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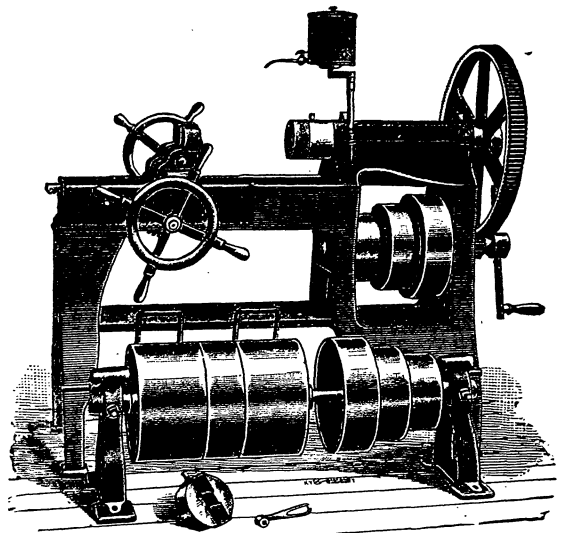
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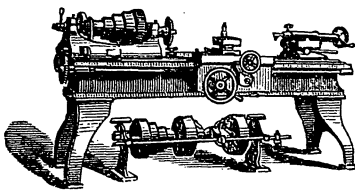


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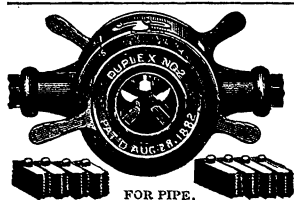
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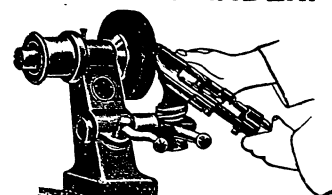
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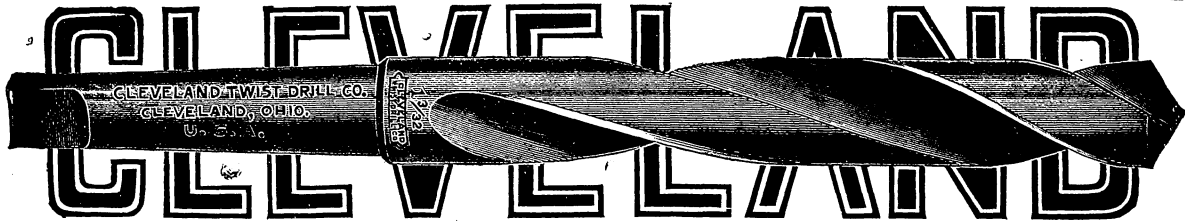
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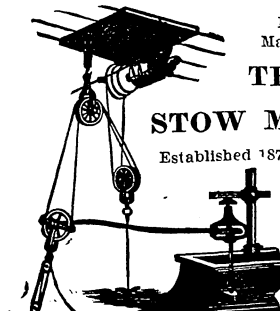
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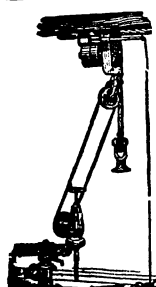
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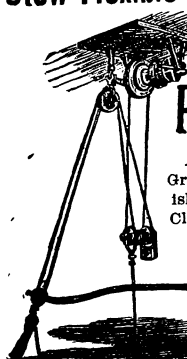
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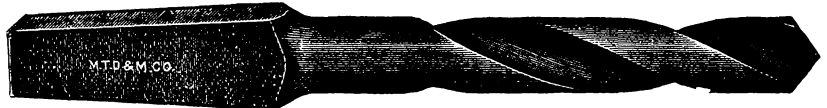
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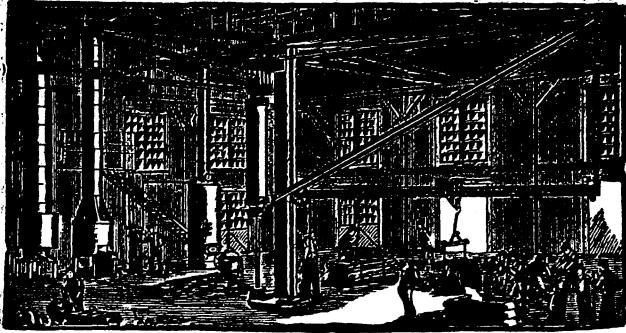
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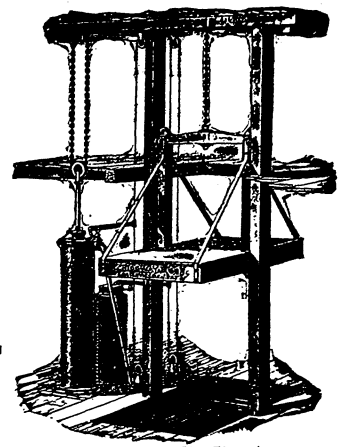


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Enclosed find clipping from the Sharon, Pa., *Telegraph*, of June 24, giving an account of an accident at our works which *fearfully* demonstrates "The Unexpected in the Foundry." A sixty-ton heat was in progress of being run off and at the second lifting of the crane ladle, the hoisting chain parted and let the ladle drop five feet, striking the side of the cupola's ladle pit, and throwing the metal over the body of George Miser. Though almost enveloped by seething fluid iron, he retained his senses, and while attempting to crawl out of the metal was grasped by two men, who were horrified to find his skin come off at every touch. The unfortunate man lived three hours. It is the first serious accident I have had under my management of heavy work, for 24 years in the foundry. It took two and a half hours to resume melting, and after running down what iron remained in the cupola, the bottom was dropped. The chain which broke was best English make, and tested to lift 20 tons with safety. Its load at the time of the accident was about five tons. This suggests the query, *Why do chains generally break with the lighter loads?* This, I think, is the experience of others as well as myself. Yours truly, THOS. D. WEST.

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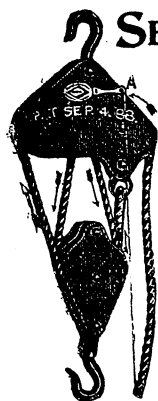
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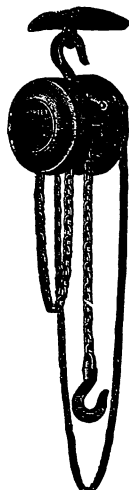
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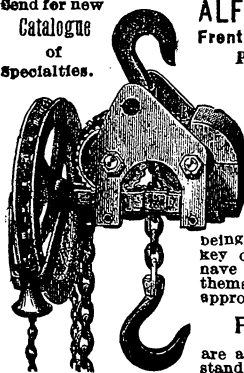
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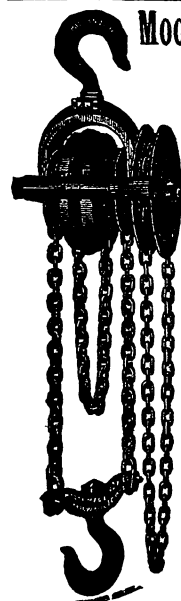
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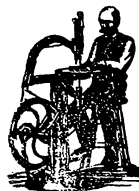
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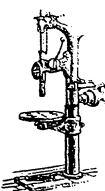
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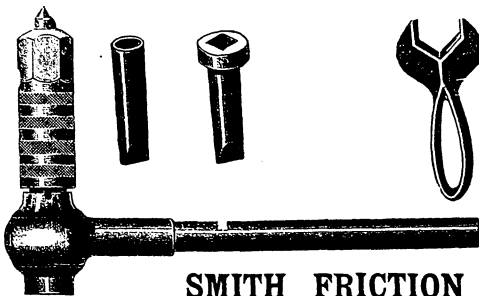
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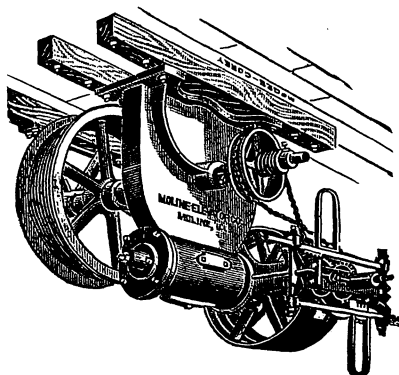
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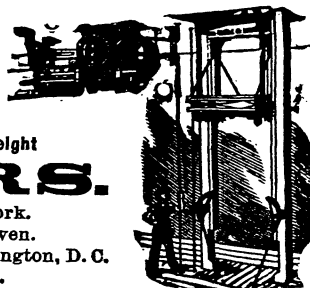
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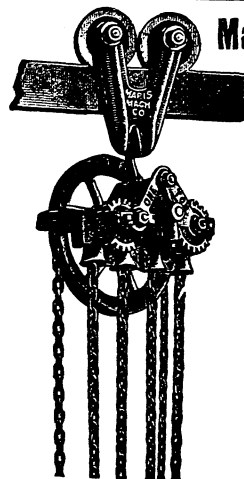
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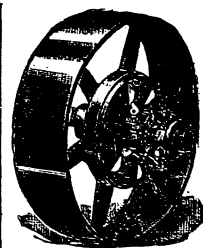
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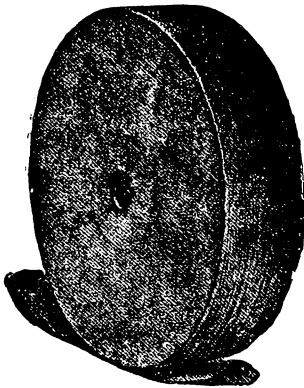
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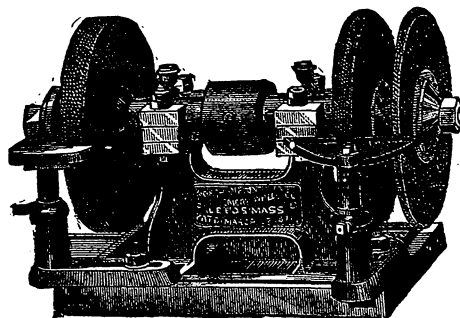
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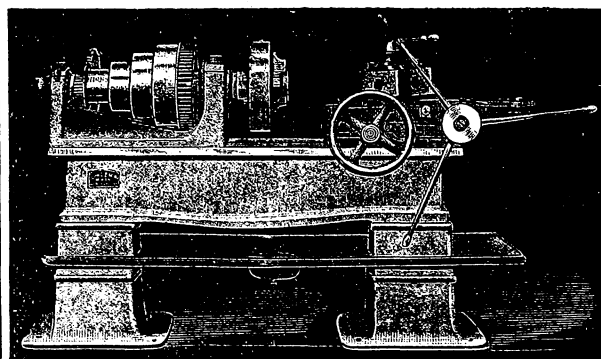
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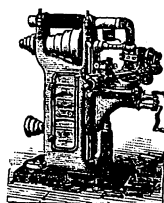
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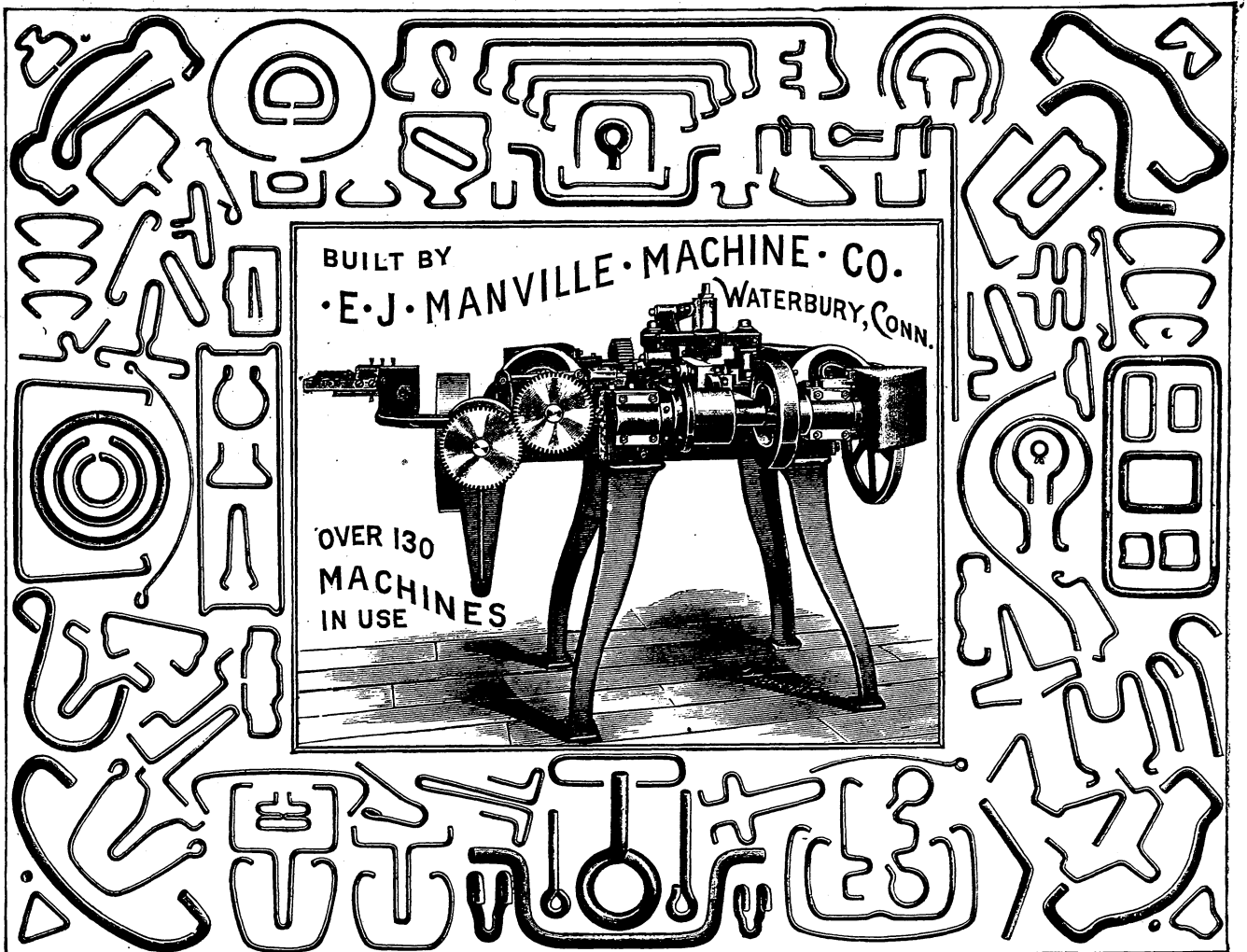


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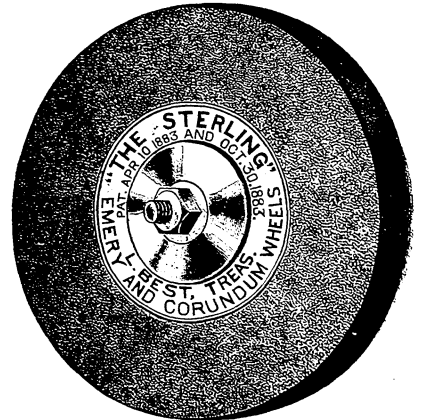
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80 in. x 18 1/2 ft. Engine Lathe, triple geared, screw feed. Good order.  
88-in. Driving Wheel Lathe, turns two wheels at one time. Good order.  
**GEORGE PLACE MACHINE CO.,**  
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## FOUNDRY FOR SALE

Or to lease for a term of years in the City of Brooklyn. Business in existence over 30 years. Recent death of former occupant the cause. Apply to **THERESA HAAS**, care of G. KEHR, 62 and 64 William St., N. Y.



# Great Bargains

**Must be Sold and Removed.**

16 in. x 30 in. Horizontal Engine.  
18 in. x 36 in. Horizontal Engine.  
24 in. x 36 in. Horizontal Engine.  
19½ in. x 48 in. Beam Engine, with Knowles Condenser.

Write us for what you want.

**LOVEGROVE & CO.,**

Third and Quarry Sts., Philadelphia, Pa.

## SECOND-HAND MACHINERY.

One Belden 100-lb. Upright Power Hammer.

One American Tool Co.'s No. 2 Cabinet Turret Lathe, with slide rest; in fine order  
One Pratt & Whitney 36-in. Gap Chucking Lathe.

One Pratt & Whitney No. 3 Lincoln Milling Machine.

One Iron Planer, 42 in. wide, 42 in. high, 6 ft. long, with one head.

One Iron Planer, 52 in. wide, 44 in. high, 12 ft. long, with two heads.

One Springfield Universal Grinding Machine No. 3, swing 18½ in. over the ways and take 6 ft. between centers. Has been used but a very few times and is practically new.

Send for circular of Second-hand Machinery in stock.

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The entire equipment of the United Electric Traction Company of Marion, N. J., comprising:

81 Engine Lathes, from 14 in. to 48 in. swing.  
15 Hand Lathes, from 10 in. to 20 in. swing.  
5 Planers, from 24 in. x 5 ft. to 32 in. x 12 ft.  
6 Shapers, from 15 in. to 20 in. stroke.  
13 Drill Presses, all sizes up to 32 in. swings.  
2 Milling Machines, Plain and Universal.  
2 Brown & Sharpe Screw Machines.  
1 Large Newton Slotting Machine.  
1 Large Radial Drill Press.  
3 Gould & Eberhardt Automatic Gear Cutters, 36 in., 48 in. and 60 in.  
1 Betts Machine Co. Large Horizontal Boring Mill.  
1 No. 2 Diamond Universal Grinding Machine.  
9 Large Bliss Power Presses.  
Also Tool Grinders, Die Sinks, Tapping Machines, Bolt Cutters, and Large Pattern and Blacksmith Shop Equipments.  
Also one 10 H.-P. Baxter Engine, with 15 H.-P. Boiler complete. As good as new.

These tools are all in A1 condition and of the very best makes in this country. They will be sold at remarkably low prices, and must be disposed of at once. Call at our salesroom and inspect them, or write for complete descriptive circular and price-list.

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### BLAST FURNACE.

Blowing Engine, made by West Point Foundry. Cyl. 36 in. x 8 ft. stroke, two flywheels 27 ft. diameter, blowing cylinder attached to main piston. Will sell cheap. This is a modern and complete engine. Address **G. W. SCHULTZ & CO.,** 308 Walnut St., Philadelphia.

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50 tons 60-lb. Steel T's, Bethlehem make.  
25 tons 45-lb. Iron T's, with chairs, no joints.  
50 tons 20-lb. Steel T's. Fine order.

## LOCOMOTIVES.

One 20-ton, 36-in. gauge, with tender. Fine.  
One 17-ton, 36-in. gauge, saddle tank. Fine.  
One 7-ton, 39-in. gauge, saddle tank. New.  
One 14-ton, standard gauge, saddle tank.  
One 10-ton, standard gauge, saddle tank.  
Send for details and prices.

**THOS. P. CONARD,**

208 Walnut Place, Philadelphia, Pa.

## REMOVAL SALE

of all the SECOND-HAND MACHINERY, comprising CORLISS and SLIDE VALVE ENGINES; single and duplex PUMPS, both simple and compound; DYNAMOS, BOLT MACHINES, PULLEYS, SHAFING, HANGERS and BELTING contained in the five-story buildings Nos. 61-63 Rutgers Slip.

Send for list and prices to

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## SECOND-HAND MACHINERY.

Boring Mill, 10 ft. 4 in. swing, 56 in. under cross rail, table 7 ft. 6 in. in diameter.

Boring Mill, 8 ft. 4 in. swing, 48 in. under cross rail, table 6 ft. 6 in. in diameter, two heads on cross rail.

76-in. Planer, 13 ft. long; heavy and powerful.

48-in. Car Wheel Borer.  
Axle Lathe.

Write for photographs and further particulars.

Eastern Branch,

**NILES TOOL WORKS CO.,**

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### MACHINERY, TOOLS, &c.

IN STOCK, LARGE LINE OF NEW AND SECOND-hand engines, boilers and machinists' tools for sale or exchange. Let me know your wants and what you have for sale or exchange. Below are some special bargains:

100 H.-P. Corliss Engine. 60 H.-P. Atlas Automatic engine.  
20 H.-P. to 60 H.-P. plain slide valve horizontal engines  
2 H.-P. to 50 H.-P. vertical engines  
2 H.-P. to 10 H.-P. Baxter engine boilers.  
6 H.-P. and 10 H.-P. hoisting engines with boilers.  
1, 2, 4 and 6 H.-P. yacht engines.  
4 H.-P. and 7 H.-P. gas engines.  
4 50 H.-P. portable boilers.  
50 H.-P. and 100 H.-P. locomotive boilers.  
10 H.-P. to 100 H.-P. horizontal and vertical boilers.  
20 screw-cutting lathes of different sizes.  
Several rod-feed turning lathes.  
Milling machines, gear cutters.  
6 in., 12 in. and 15-in. shapers.  
24 in. and 36 in. planers.  
44 in. radial drill, 1¼ National bolt cutter.  
No. 3 Fowler press, 2 10 in. exhaust heads.  
25 lbs. Bradley and 10 lbs. Hotchkiss Hammers.  
Catalogues.  
Frank Toomey, 131 N. Third St., Philadelphia, Pa.

### SOME BARAINS HERE.

1 Hendey Shaper, 15 in. stroke, imp. vise; new.  
1 14 x 6 Screw Cutting Engine Lathe; new.  
4 H.-P. Comb. Engine and Boiler. Fine condition.  
Hendey Cutting-off Machine. New.  
1 3-Spindle Garvin Drill Press, used 1 month.  
30 x 16 Pond Lathe. Good condition.  
72 x 72 x 20 Planer. 2 Cross Heads.  
1 75 H.-P. Westinghouse Automatic Engine.  
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Also variety of Engines, Boiler Pumps, &c.  
And other machinery, new and second hand. Write for prices. **Machinists' Supply Company,** 39, 41 and 43 Central Ave., Rochester, N. Y.

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Jobbing Iron Foundry, in center of manufacturing district; within 1 mile of Court House Chicago. Address **BOX 154, Rogers Park Ills.**

**Iron Tanks, Hydraulic Press, Corliss and other Automatic Engines, Slide Valve Engines, Boilers, Steam Pumps, etc., etc.**

TANKS.—Rendering Tanks, Square Tanks, Round Tanks, and Pans; from Soap Works, cheap before removal.

HYDRAULIC PRESS, 600 to 800 tons, with R. Hoe & Co. Air Pump for same.

CORLISS ENGINES, 30 x 72, 30 x 60, 26 x 48, 23 x 36, 10 x 24, and other sizes; also other Automatic and Slide Valve Engines.

Two WESTINGHOUSE ENGINES, 60 and 25 H.-P.

HORIZONTAL BOILERS, 5½ x 16, 5½ x 14, 5½ x 10, 5 x 18, 4½ x 12, and others. Brennan Crusher, 8 x 25. Bogardus Mill. Ingersoll Rock Drill. Woodward Double Fire Pump, 1000 gallons. Worthington Duplex Pump, 25 x 12 x 24. Four-side Wood Planer and Matcher. Also assortment of Steam Pumps.

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**BAKER BLOWERS**, Nos. 1, 4½, 5, 6 and 7.  
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Sturtevant Blowers, Nos. 4, 5, 6, &c.  
1 Corliss Band Wheel, 12 ft. x 21 in. in halves.  
A Variety of Machinery, Such as Boilers, Engines, Pumps, Crushers, &c., very cheap.  
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For sale cheap. Made by **Carrison & Co., Pittsburgh;** complete and modern; 3-roll high, flywheel 20 tons, 5 sets Housings, pinions, rolls, bedplates, &c., in perfect condition. Address

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## MACHINE TOOLS,

New and Second-hand, For Sale.

Hendey's "Norton" Screw Cutting Lathes. Cut 12 threads without changing any gears. 36 speeds for the side feed.  
Garvin Screw Machines.  
Dwight Slate Sensitive Drills.  
A line of second-hand Tools, also small Electric Fan Motors.

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even second-hand is marketable somewhere. If you wish to **SELL** or **BUY** Machinery, Supplies, Manufactured Products, Special or Job Lots, write me, as I am always ready for a trade. Send for list.

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## For Sale, Cheap. LOCOMOTIVES AND CARS.

Standard and narrow gauge boarding, box, coal, flat, refrigerator and passenger Cars. Also large quantities of relaying and scrap rails, car wheels and scrap, pig iron, muck bars, &c.

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## BOILERS AND SHEARS FOR SALE.

Two Tubular Boilers, 48 in. diameter, 16 ft. long, with fronts, grate bars and fittings complete. Also one Double Deck Tubular Boiler, without settings. All guaranteed for 90 lbs. steam. 1 large lever Plate Shear, cutting to ¾-in. plate. 1 Rotary Trimming Shear, will cut 3-16 in. Apply to

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contemplating the expenditure of a large amount in the establishment of a manufacturing industry, requiring the use of a thoroughly equipped Machine Shop, Boiler Shop, Foundry and Smith Shop plant, well located on competing trunk lines of railroads and in a good labor market, is invited to address

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80 in. x 18½ ft., Geared Face Plate.  
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48 in. x 27 ft., cheap.  
56 in. x 18 ft., Geared Face Plate.  
36 in. x 16 ft.  
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30 in. x 28 ft., Shafting Lathe, Pond.  
28 in. x 22 ft., cheap.  
24 in. x 10 ft.,

25 in. x 12, 16, 20 and 24 ft.  
22 in. x 10 ft.  
20 in. x 8, 10 and 12 ft.  
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18 in. x 6, 7 and 8 ft.  
17 in. x 6 and 7 ft.  
16 in. x 6 and 8 ft.  
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14 in. x 6 ft.  
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### PLANERS, SHAPERS, SLOTTERS.

5 ft. x 22 in.  
4 & 5 ft. x 24 in.  
6 ft. x 24 in.  
5 ft. x 25 in.  
5 ft. x 26 in.  
7 ft. x 26 in.  
6 ft. x 31 in.  
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12 ft. x 60 in., 22 ft. x 72 in., 4 heads.  
16 ft. x 42 in., 9, 12, 15, 16 in. stroke  
18½ ft. x 84 in., Shapers.  
3 heads.  
22 ft. x 62 in., Shapers.  
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Lincoln Millers Gang Drills, Screw Machines.  
Steam Hammers, 100, 1000 and 3000 lbs.  
Drill Presses, 20, 24, 26, 28, 30, 44 in., Upright.  
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Corliss Engines, 12 in. x 24 in. and 16 in. x 42 in.  
Brown Engine, 16 in. x 48 in. Whitehill, 11 in. x 18 in.  
Vertical Engine, 13 in. x 16 in., N. Y. Safety Steam  
Power Co.  
Send for latest list.

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### 4 BOILERS.

Four second-hand 75 H.-P. Double-Deck Boilers, with all fittings and fixtures. In first-class condition. Cheap.

Two 2-flue Boilers, 48 in. diam. x 32 ft. long, in prime condition. Cheap.

One 16 x 22 Side Crank Engine.

One 16 x 36 Side Crank Engine.

Full line of new and second-hand Boilers and Engines always on hand.

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500 tons Relaying Steel Street Rails, side bearing. Also 25-lb. section Relaying Iron T Rails.

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## WANTED.

Foundry Contracts to be completed before September 1st. Capacity of works, 9 tons per day. Can make close prices and prompt shipment.

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6 No. 7 Power or Hand Pipe Machines.

1 24-in. Back Geared Drill Press; back and forward motion.

1 Wells Brothers Bolt and Nut Cutter, No. 12.

1 Machine Lathe, 13-in. swing.

1 No. 4 Wiley & Russell Drill Press.

Lots of Shafting, Pulleys, Belting, &c.

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To furnish reasonable estimates on specialties in light metal work.

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Manufacturers of Clock Trimmings, Rivets, Springs &c.

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### Pair of Mine Hoisting Engines,

100 H.-P., double geared, very strongly built.

### Locomotive Boilers,

all sizes, fitted to suit customers.

Full line of Engines and Pumps, guaranteed first class. It will pay you to see our stock before buying.

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### STEEL RAILS, Side and Center Bearing.

Fit to relay. Apply to

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2 Double Deck Boilers about 40 H.-P. each, cheap. Hoisting Engine. Cylinder Boilers for Stacks, 80, 40 and 42 in. diameter. Round and Square Iron Tanks. Book Binding Machinery. Smoke Stacks, light and heavy, all sizes. Large lot Cast and Wrought Scrap Iron on hand. Also Dealers in Metals.

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43 Engines, 26 inch diameter and smaller.  
16 Hoisting Engines.

11 Pair of Rail, Bar, Sheet and Clipping Shears.

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50 Cast Iron Lamp Posts, fancy.  
800 ft. Wrought Iron Fence, 3 ft. high, scroll work.

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A second-hand Iron Building, 80 ft. x 428 ft. x 14 ft., height of post. Will be sold low for prompt cash. For further particulars inquire of

EASTERN FORGE CO.,

Boston, Mass.

## IF YOU WANT A NIAGARA DYNAMO OR MOTOR

or if you are a dealer and want an Agency send for our Catalogue and Price-List.

LOVELL MFG. CO., LTD., ERIE, PA.

## GOOD VALUE.

1' Bausoh Radial Drill, 36 in.

1 Gould & Eberhardt Shaper, 18 in.

Above are 2d hand.

1 Hendey Lathe, 21 in. x 10 ft.

1 " " 16 in. x 6 ft.

Above are new.

The Scranton Supply and Machinery Co.,  
Scranton, Pa.

## FOR SALE CHEAP.

40 H.-P. Phoenix Engine, good as new.

1 Upright Plate Shear, 15-inch blade; in first-class order.

Address

SCHWARZENBERG BROS. & CO.,

167 to 189 Scranton Ave., Cleveland, O

## FOR SALE.

31 four-wheel, 5-ton Lime Cars, cheap. Address

"CARS,"

Office of The Iron Age, 220 South 4th St., Philadelphia, Pa.

## BLOWERS FOR SALE.

Nos. ¼, ½, 1, 6 and 7 Root's Pressure Blowers, in A1 order and cheap.

Also 15 horse-power Greenfield Upright Engine, good as new.

COOKE & CO.,

163 and 165 Washington St., New York.

## A LINE OF SPECIALTIES OR TOOLS WANTED.

We want a line of Tools or specialties that will work in nicely with our own line. Our representatives visit all the best towns and cities in the United States and Canada, and we have also a regular office with complete stock in New York City. Address

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10,000 tons Mill Cinder 54 per cent metallic iron; Philadelphia Delivery.

200 tons Burnt Cast Iron Scrap.

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100 tons Old Boiler Iron, cut at rivets.

50 tons 1-in. thick Fiat Wrought Iron

Plates, 4 ft. x 15 ft.

Inquiries for Iron and Steel Scrap solicited.

ALSO FOR SALE:

One 250 H.-P. Horizontal Engine, 22 in. x

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One 300 H.-P. Double Exp. Engine, 16 in.

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One 24 in. x 60 in. Horizontal Engine.

Four 50 H.-P. Porter-Allen High Speed

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For particulars and low offerings address

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Responsible parties to manufacture and sell on royalty, a cheap portable steel or iron CULVERT BRIDGE; it is adapted to all small streams, runs, etc., in roads, streets, RAILROADS, etc.; improved roads is the order of the day; use this bridge, put it below the level of the road, cover it over and thus prevent jarring and wear and tear of vehicles, etc Apply to

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### Special lot of

### NEW ENGINE LATHES,

ANY LENGTH OF BED.

Sizes 13, 15, 17, 20 and 22 in.

ADDRESS

Draper Machine Tool Co.,

Successors to

LATHÉ & MORSE TOOL CO.,

130 Gold Street.

WORCESTER, MASS.

# Assignee's Sale.

**ASSIGNEE'S SALE.**—The undersigned, Assignee of the Roelker Stove and Plow Co., of Evansville, Indiana, by order of the Superior Court of Vanderburgh County, Indiana, will, on the **SIXTH DAY OF SEPTEMBER, 1893**, on the premises of said company, on Main and Sycamore streets, between Fifth and Sixth streets, commencing at 10 o'clock a.m., and continuing until all said property is disposed of, sell all the real and personal property of said corporation, consisting of plows, stoves, castings, patterns, flasks, tinner's stock, raw material for the manufacture of stoves and plows; also all tools and machinery used in the manufactory. The above property will be sold for CASH.

The property to be sold is one of the best equipped plants for the manufacture of stoves and plows in the West. The buildings have been erected and machinery placed with special reference to the business, and everything is in perfect condition to continue the business.

The Roelker Stove and Plow Co. is widely and favorably known and its stoves and plows are in great demand—a purchaser could not only purchase a thoroughly equipped plant, but could also secure the good will of a thoroughly advertised business of thirty-eight (38) years' active operation. The property will be sold at public auction to the highest bidder. If purchaser cannot be found for the entire plant, then it will be divided and sold in such quantity as may secure the best returns.

No better opportunity was ever offered for a profitable investment.

In the meantime propositions will be received for private sale of all or part of above described real estate, and also for either or both the stove and plow manufacturing business, with all its manufactured stock, raw material, patterns, machinery, tools, &c., connected with the above-named business. Address

JOHN H. POLSDORFER,

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## \$99.50 FREE.

For 50c. I will send you a pamphlet containing 50 well written advertisements, each of which is worth easily \$2.00. If you want to catch the trade of your town send 50c. in stamps and get pamphlet by return mail.

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4 and 6 Warren street, New York.  
JAS. H. GOLDEY, Treas.

## Any Manufacturer

of Hardware or Machinists' Specialties desiring to be represented in New York City and vicinity, will find it to his interest to address

E. J. HUSSEY & CO.,  
80 John St., New York.

We are centrally located, active workers and can furnish best of references.

## Hardware Stock For Sale.

A \$4000 stock in a fine manufacturing town with a population of about 6000. Annual sales \$35,000. Tin shop in connection, with large factory trade and telephone connections with all factories and Chicago. This is one opportunity in a lifetime. Terms cash. If you want a bargain address "D," office of *The Iron Age*, 59 Dearborn St., Chicago, Ill.

## MANUFACTURERS' AGENT

for direct Southern trade. Principal cities visited frequently.

Address

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**WANTED.**—Agency for States of Kansas and Nebraska for a few lines of fast-selling specialties; hardware or woodenware preferred. Address, with terms, &c.,  
CONNAUGHTON & BREESE,  
Lock Box 1263, Wapakoneta, Ohio.

## AGENCIES WANTED.

Would like a few good lines to handle on commission to hardware and kindred trade; good references; have office and headquarters in Chicago. Address "AGENCY," office of *The Iron Age*, 59 Dearborn St., Chicago.

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## FOR SALE. Ten Steam Yachts.

Now in use carrying passengers at the World's Fair, Chicago. Will sell and contract to deliver them afloat in any waters of the U. S., after close of the fair, November 1st; two for immediate delivery. Licensed to carry 75 passengers each. The chance of a lifetime for anybody wanting a steam yacht.

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Make the same entry but once. A Ledger in place of a full set of books. Convenient forms for all entries. Easily applied, simple, saves time. West's Self-Proving Balance locates every error. Send 3 2-cent Stamps for illustrated 16-page pamphlet.

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I make a special business of buying and selling Job Lots of

## HARDWARE AND CUTLERY

Tools and Second Quality Files a Specialty.  
Send for Catalogue,

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## BLOWING ENGINE FOR SALE

Vertical pattern, with balanced steam slide valve gear, steam cylinder 14 in. diameter, air cylinder 40 in. diameter, stroke 24 in. 1 to 100 strokes per minute; engine new.

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Largest wholesale house in America for Mirrors of all kinds, Pictures, Mouldings, Frames, Brackets, Easels, Screens and kindred goods. Large illustrated catalogue sent to Dealers upon application.

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### E. BISSELL, SON & CO.,

AUCTIONEERS,

Thursday, August 17, 1893,  
at 10 o'clock sharp,

At Nos. 12 Murray Street and  
15 Park Place, New York.

—BY ORDER OF—

The Lalance & Grosjean Mfg. Co.

AND

The St. Louis Stamping Co.

LARGE SPECIAL AND PEREMPTORY  
TRADE SALE OF

## Gray Enameled OPAL WARE

AND

### GRANITE IRON WARE and BLUE and WHITE WARE.

The goods will be sold in CASE LOTS,  
packed ready for shipment, and will  
consist of a complete line of

Tea and Coffee Pots, Wash Basins, Tea Kettles, Convex, Berlin, Lipped and Climax Sauce Pans and Pots, Preserving Kettles, Dish, Milk, Pudding and Fry Pans, &c., &c.

OUT-OF-TOWN BUYERS of these goods unable to attend the sale can order from the **Lalance & Grosjean Mfg. Co.'s and St. Louis Stamping Co.'s catalogues.**

Orders to purchase will be executed by the Auctioneers **free of commission.**

The entire catalogue with duplicates will be sold **absolutely without reserve.**

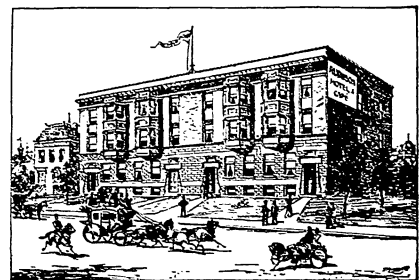
This sale deserves the attention of the entire trade.

All buyers of House-furnishing Goods should make an effort to attend, as the line is large and desirable, and worthy of their attention.

Catalogues mailed as soon as ready to those who desire them.

Also a large line of Shoe and Cloth BRUSHES,  
first quality.

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Midway Plaisance and Oglesby Ave.

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**AT THE AUDUBON.**  
WHY?

It is convenient.  
It is new and clean.  
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It is reasonable in charges.  
It has refined patronage.  
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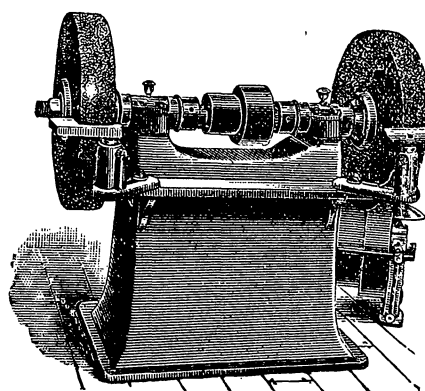
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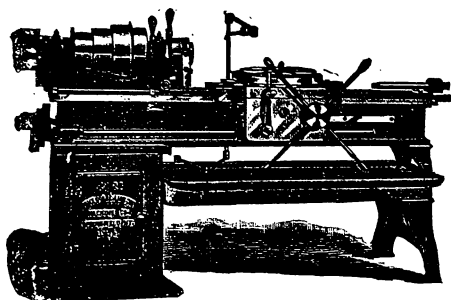
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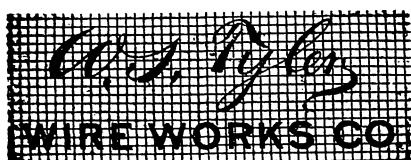
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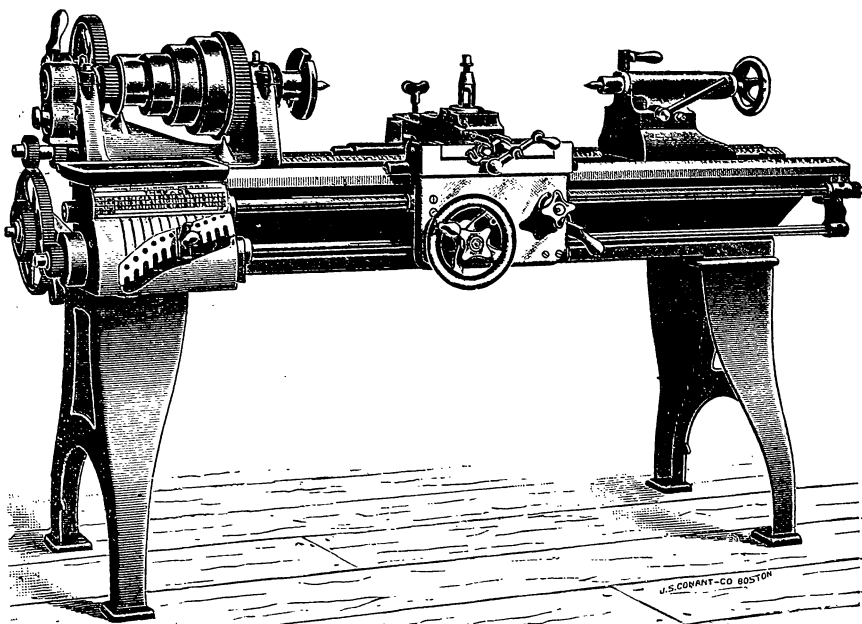
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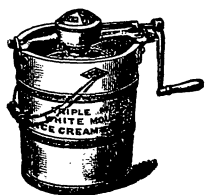
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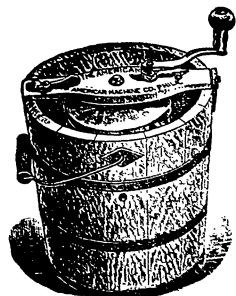


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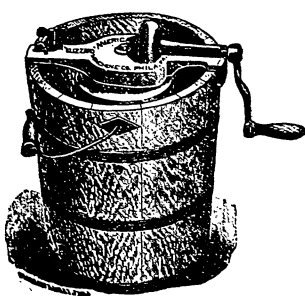
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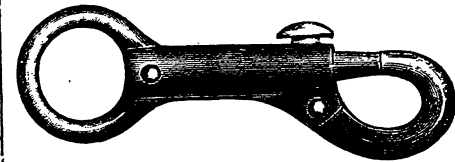
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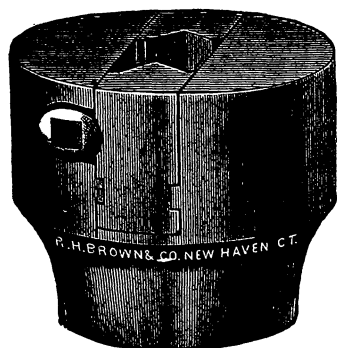
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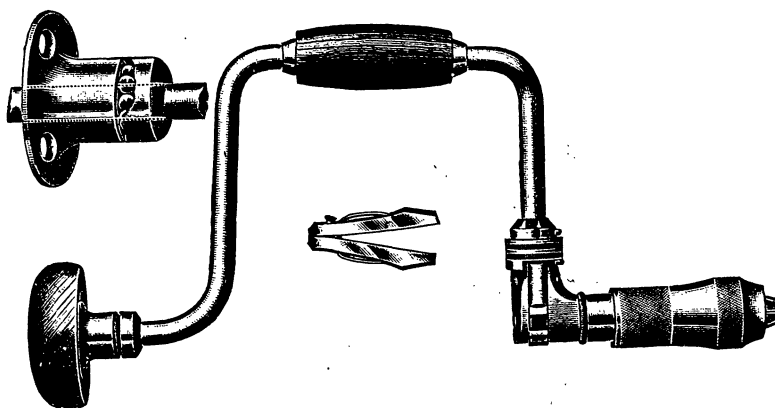
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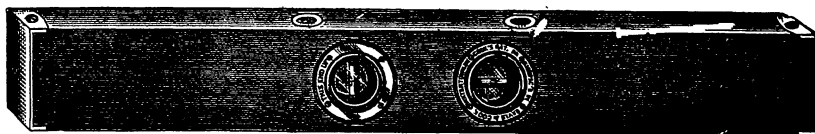
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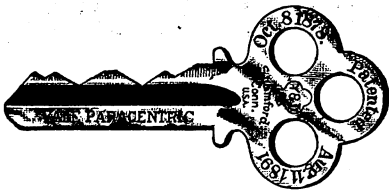
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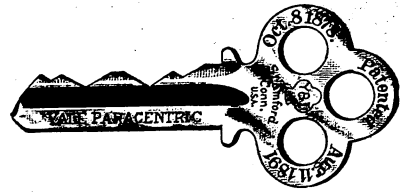
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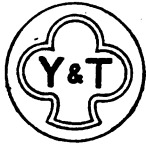
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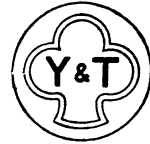
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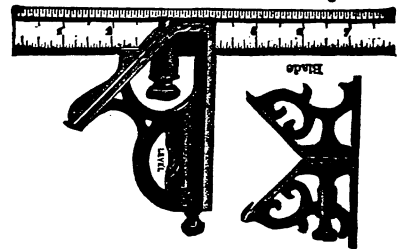
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CHAPLIN TRY AND CENTRE SQUARE.



Also a full line of

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ATHOL MACHINE CO., Selling Agents.

**IT PAYS.** Nothing about a Hard  
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are attracted by such a display of care, and no-  
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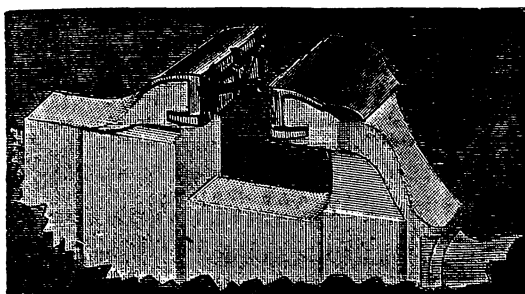
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**BINGHAM**  
**PATENT VISE JAW CAL**

Will Fit any Kind of Vise.

For protecting finished work. Will hold finished rods of any shape without injury.

3 1/4 inch, ..... per pair, 40 cents.  
4 1/4 " ..... " " 50 "  
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44 Barclay St., New York.

# W. & B. DOUGLAS, MIDDLETOWN, CONN.

Branch Warehouses: 85 and 87 John St., New York; 197 Lake Street, Chicago, Ill.

THE OLDEST AND MOST EXTENSIVE MANUFACTURERS OF

## Pumps, Hydraulic Rams, Garden Engines,

Yard Hydrants, Street Washers, Galvanized Pump Chain, Wind Mill Pumps and other Hydraulic Machines in the World.

## DOUGLAS' DIAPHRAGM PUMPS, "Loud Patent."

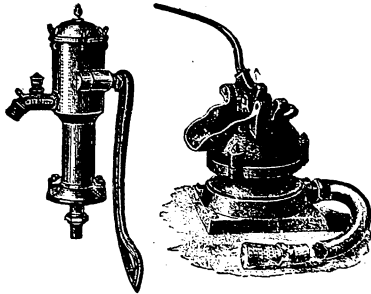
A LARGE CAPACITY AND EASY WORKING PUMP FOR

Water Works, Sewer Contractors, Foundation Builders, Mines, Quarries,

Fig. 209.

Fig. 381.

Fig. 145.



or wherever it is desired to raise a large quantity of water by  
hand power.

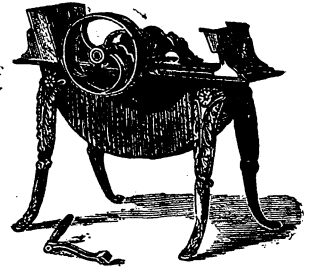
The pump has large valves (accessible by hand), and will pump water containing sand, gravel, sewage matter, &c., without choking or any perceptible wear.

CAPACITY

from 3,000 to 4 500 gallons per hour.

These pumps are simple, durable and low priced.

Made either as shown in cut for Hose or for IRON Pipe Suction underneath.



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FACTORY  
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ARTESIAN WELL CYLINDERS  
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**THE H M MYERS COMPANY**  
**ONE SOLID STEEL SHOVELS**  
THE BLADE AND STRAPS  
Are made from this one solid Piece of Steel.  
A Perfect Plain Back Tool With thick Centre.  
**WITHOUT WELD OR RIVET**  
CAREFULLY TEMPERED  
WRITE FOR LISTS BEAVER FALLS, PA. AND DISCOUNTS

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LIFT PUMPS  
WORLD'S  
THE LARGEST PUMP & TOOL WORKS EXCLUSIVELY IN THE UNITED STATES

Ashland Pump and Hay Tool Works.

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Office, 35 Barclay St. Warehouse, 40 Park Place, New York.

SELLING AGENTS FOR

"Perfection" and "New Easy" Lawn Mowers,  
Cortland Door and Window Screens,  
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Full line Steel and Wood Farming Tools. Shipments from Factories or Store.  
Spring Catalogue No. 5 Issued in February.

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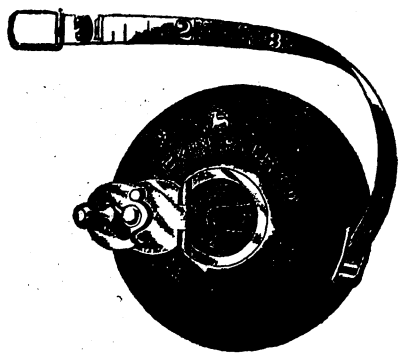
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The New York Safety Dumb Waiter,  
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"The Improved Humphrey Hand Elevator,"  
Made specially to be sold by Hardware Stores. Thousands in use. Catalogues on application.  
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SHIFTABLE REVERSIBLE  
FOR SHELVING STORES, LIBRARIES, CUPBOARDS, & C.  
BRACKETS  
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MAKERS OF ALL KINDS OF  
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Entirely new. Handle or crank when closed is perfectly flush with leather case. Opens by pressing button on opposite side and folds out double, giving increased leverage. Best and most convenient steel tape on the market. Fully guaranteed. Will send samples on approval. We carry a complete stock of our goods at our New York Office, 20 Murray St.

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(COVERED BY U. S. LETTERS PATENT.)

Mounted on reels and always ready for use and convenient to handle. Easily and quickly binds shipping cases and crates in a neat, strong and substantial manner.

### PRICES:

No. 1, per reel of 2000 ft., \$4.50 net.  
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Pliers for cutting wire, 50 cents extra.  
No. 1 for cases under 300 or 400 pounds, and No. 2 for all heavier cases.

Buffalo Specialty Mfg. Co.  
Sole Manufacturers,  
Buffalo N. Y. U. S. A.

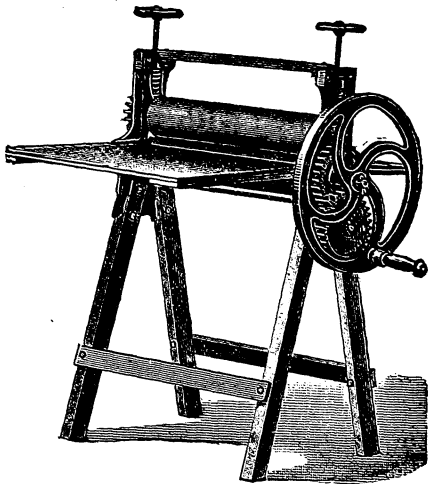
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WARRANTED TO DO

Better Work than Hand-work.

**SAVES** all the fuel,  
two-thirds the work.  
Keeps the linen whiter.

We Guarantee Every Machine.



Send for descriptive circular to

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## THE "AUBURN" ICE TONGS.

For Quality of Workmanship and Price the "Auburn" excels all other tongs on the market.

SEND A TRIAL ORDER AND BE CONVINCED.

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BUSINESS ESTABLISHED  
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**JOS. F. McCOY CO.,**

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—Importers and Dealers in—

**HARDWARE, CUTLERY, TOOLS**

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Headquarters for

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Manufacturers of the Best Charcoal "Sad Iron" in the world for Families, Dress and Cloak Makers and Tailors. Send for Circulars and Sample Irons. Agents wanted everywhere

## IRON INSTEAD OF WOOD. GALVANIZED IRON TUBING and CURB,

—FOR—  
**CHAIN PUMPS,**  
(Kegler's Patent)

Are Giving Universal Satisfaction,

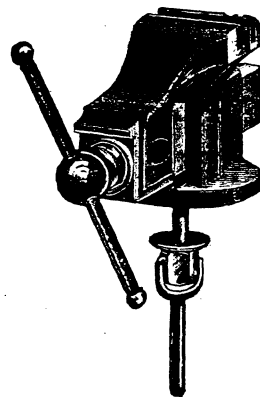
BECAUSE:



They do not rust and accumulate filth—always clean. Extreme lightness is combined with strength and durability. No freezing. No waste of water by reason of enlarged reservoir at top of tubing. No annoying wheel at bottom. Easy to handle. Tubing weighs less than 1/2 lb. per ft., is connected by couplings and can be attached to any make of curb.

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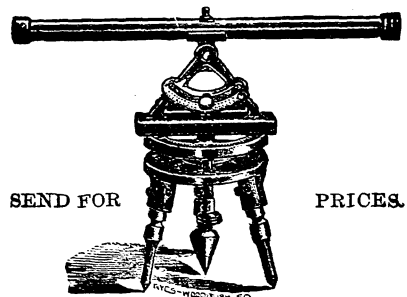


**HOLLANDS'  
OFFSET JAW  
VISE.**

Specially adapted for drill press work where chucks cannot be used and equally good for special or regular bench work.

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Manufacturers all  
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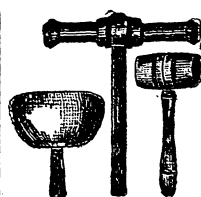
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Manufacturers of Iron Levels

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## Break it Down!!!

—IF YOU CAN.—



BRADLEY  
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BRACKETS

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LIGHT,  
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PROFITABLE.

THEY ARE GREAT SELLERS.

"I have NEVER HAD A CALL for this bracket," a certain dealer once said to us.

His competitor was taking good care that he should not.

You want "TO BE IN IT" this fall. Let us send you our catalogue and prices.

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SOLE MANUFACTURERS.

PAT. NOV. 8,  
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LOUIS DUHME, Vice-Pres.

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## The National Saw Co.,

## OPERATING

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## GENERAL OFFICE

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## SAWS

## Three Essentials

IN THE MODERN  
CROSS-CUT SAW.

- 1.—Teeth of uniform thickness.
- 2.—Five Gauges taper in middle of blade.
- 3.—Three Gauges heavier on ends than in center of back.

For 10 YEARS the Simonds Crescent-ground Cross-cut Saw (the only Saw on the market possessing these **ESSENTIALS**) has stood out prominently in contrast with all other makes of cross-cut saws. It has been the **CRESCENT-GROUND** against the **FIELD-MODERN IDEAS** against **ANCIENT METHODS**.

**TO-DAY** the Crescent-ground Saw is in use in every important lumber camp in the United States. Manufacturers have endeavored to imitate it, but the Machinery producing the Saw, the Process by which it is produced, and **THE SAW**, are patented. All imitations are but involuntary acknowledgments of the **SUPERIORITY** of

## THE CRESCENT-GROUND CROSS-CUT SAW.

(PATENTED DEC. 26, 1882.)

SIMONDS MFG. CO.,

SIMONDS SAW CO.,

FITCHBURG, MASS.

CHICAGO, ILL.

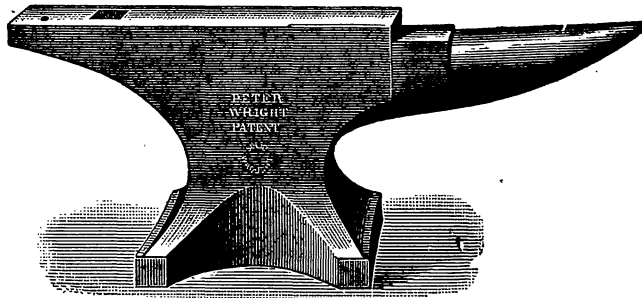
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## Peter Wright's Patent Solid Wrought Anvil

PETER  
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Fac-Simile of Trade-Mark.



Fac-Simile of Green Label.

By Royal Letters Patent.  
V. R.  
**PETER WRIGHT'S**  
SOLID WROUGHT  
**ANVIL**  
Made of Best Scrap Iron!  
THE BICK FACE AND END ALL  
IN ONE SOLID PIECE!

You are cautioned in buying to see that each anvil is stamped with the full trade-mark on one side and has the green label affixed to the other.

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PETER WRIGHT &amp; SONS, DUDLEY, ENGLAND.

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## SAWS

MANUFACTURED BY

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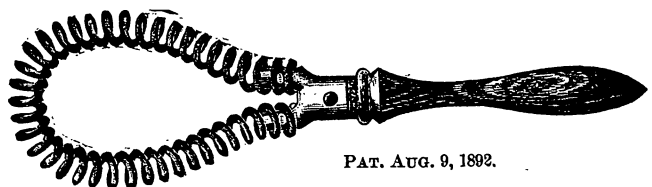


Best Common Mouse Traps, Steak Hammers, Boot Jacks, Lap Boards, Beacon Hill Pat. Mouse Traps, Mallets, Bung Starters, Hand Screws.

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**3** NICKLE, Silver and Bronze Metallic Figures and Letters, Sizes 1/4 in to 3 in. Pattern Letters, Steel Stamps, Brands, Dies &c. Send for Reduced Price List. We make a specialty of the Hardware Trade.  
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NEAT, DURABLE, AND DOES THE BUSINESS.

For removing dust and filth from Clothing, Upholstered Furniture, Rugs and Carpets it is just the thing. Will raise the nap and so improve the appearance. Will not, like other Dust Beaters, leave marks, nor tear the fabric. The coil is of steel wire secured in a malleable iron socket and attached to an enameled wooden handle. Just what everybody wants.

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"If you want a Saw it is best to get one with a name on it which has a reputation.  
A man who has made a reputation for his goods knows its value as well as its cost and will maintain it."—HENRY DISSTON.

# THE SAWS THAT LEAD THEM ALL

## DISSTON & SONS' PATENT D-8 HAND SAW.

"THE  
SAW;"

HOW

TO

CHOOSE

IT,

AND

HOW

TO

KEEP

IN

ORDER,

Sent

Free

on

Receipt

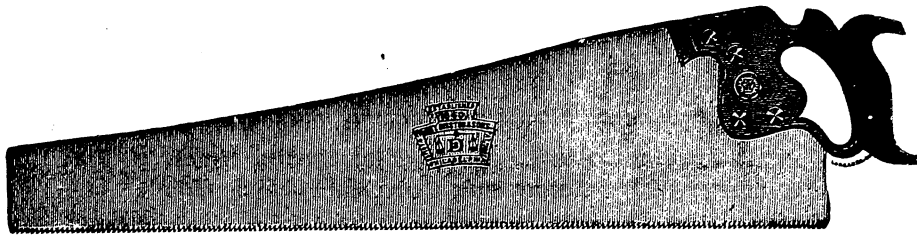
of

Name

and

Post Office

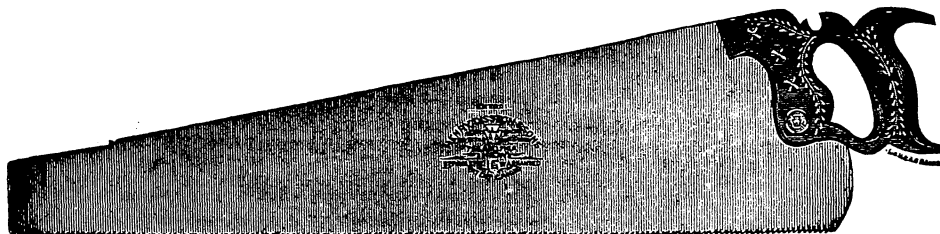
Address.



This Saw combines all the valuable improvements in Hand Saws that have been made by us of late. The first and most important is the hollow or skew back, the success of which can best be attested by the number sold. The peculiar shape of the butt or heel, coupled with the new method of fastening to the handle, give a full stroke of the blade without fear of catching or hooking in the work; and as the handle is put further on the blade you have a full stop on the proper point and a greater command over your Saw, by reason of being two inches nearer the point, which must give more power.

The Saw being let into the handle on a circle, has a perfect bearing, which, with the new screws, makes it stronger and almost impossible to work loose, and avoids the unsightly gap that is seen on the back of the old style handle. All the above features are patented.

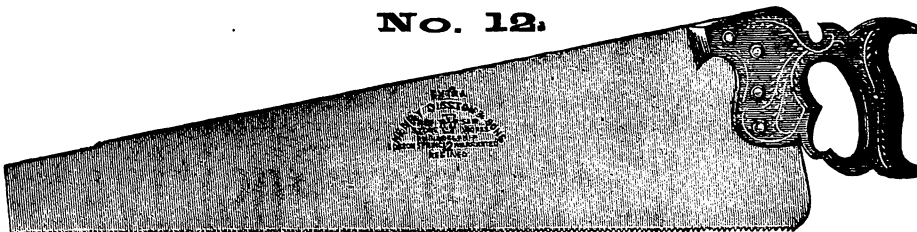
## Our New No. 16 Premium Saw.



AN EXTRA FINE SAW IN EVERY RESPECT.

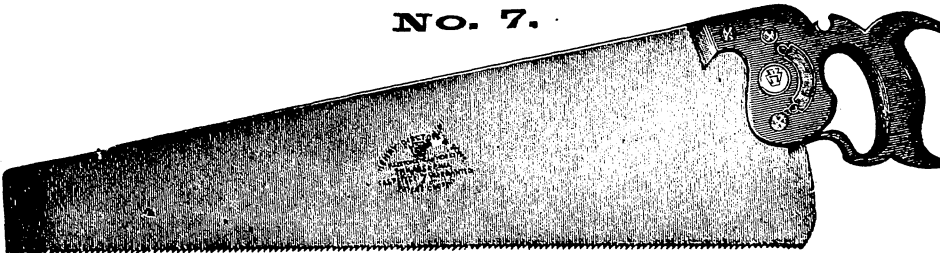
Having the Latest Close up Handle, Spring Steel Blade, Extra Thin Back, Finely Grained, with an Apple Handle and Four Brass Centennial Screws.

No. 12.



Disston & Sons' Extra Refined London Spring Steel, Selected and highly Polished Blade, Handle Carved and Polished, 4 Improved Brass Screws, the finest Hand Saw manufactured.

No. 7.



DISSTON & SONS' Cast-Steel, Warranted, Beech Handle, Polished Edge, 4 Improved Screws, Grained Blade.

"POCKET

EDITION

OF

THE

SAWYER "

and

"LUMBER-

MAN'S

HAND

BOOK,"

Sent

Free

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Receipt

of

Name

and

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Address.

ASK YOUR DEALER TO ORDER THEM FOR YOU.

# HENRY DISSTON & SONS

(INCORPORATED),

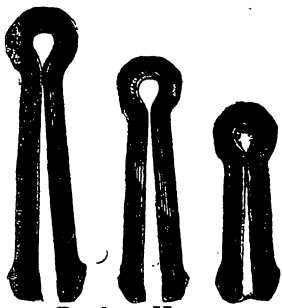
Keystone Saw, Tool, Steel and File Works, Philadelphia. Pa.

FACTORIES AT  
AKRON, - OHIO.  
CANTON, - OHIO.

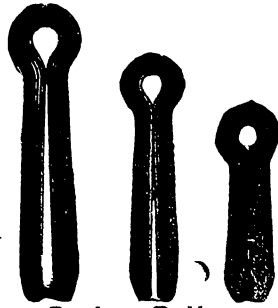
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—MANUFACTURERS OF—



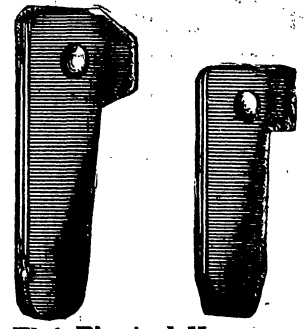
Spring Keys.



Spring Cotters.



Flat Spring Keys.



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THE LARGEST AND MOST COM-  
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THE WORLD.

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VARIETIES FILES  
AND INCREMENT CUT FILES

Philadelphia, 1876.



**McCAFFREY FILE CO.,**


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For Superiority



Manufacture and keep in stock a full line of FILES and RASPS only, for which we claim special advantages over the ordinary goods, and ask domestic and foreign buyers to allow us to compete for their trade  
*Superiority acknowledged wherever used, sold or exhibited.*

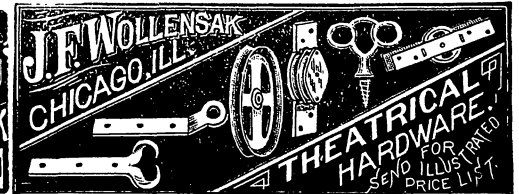
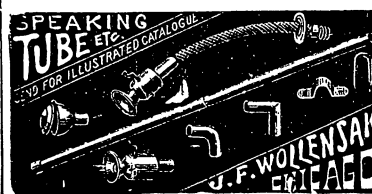
BEST		"TROJAN" HORSE RASPS.		LOWEST	
CRUCIBLE				IN	
STEEL.				PRICE.	
STRONGEST		BANKER & WHITE,		TROY, N. Y.	
TOOTH.		(Troy File Works.)		LET US QUOTE.	

## The Taintor Positive Saw Set.

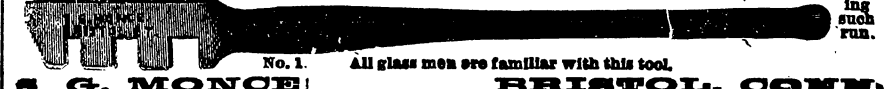
Mechanics are now inquiring for this tool, and Hardware Dealers should have them in stock, or at least have a sample.

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**WIEBUSCH & HILGER, LTD., SOLE AGENTS,**  
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MONCE'S Novelty Glass Cutters are the standard. No. 17 just out. Send for Illustrations and Price. We also make the Compartment Font Interchangeable Lock Stencils that are having such run.



No. 1. **G. MONCE**

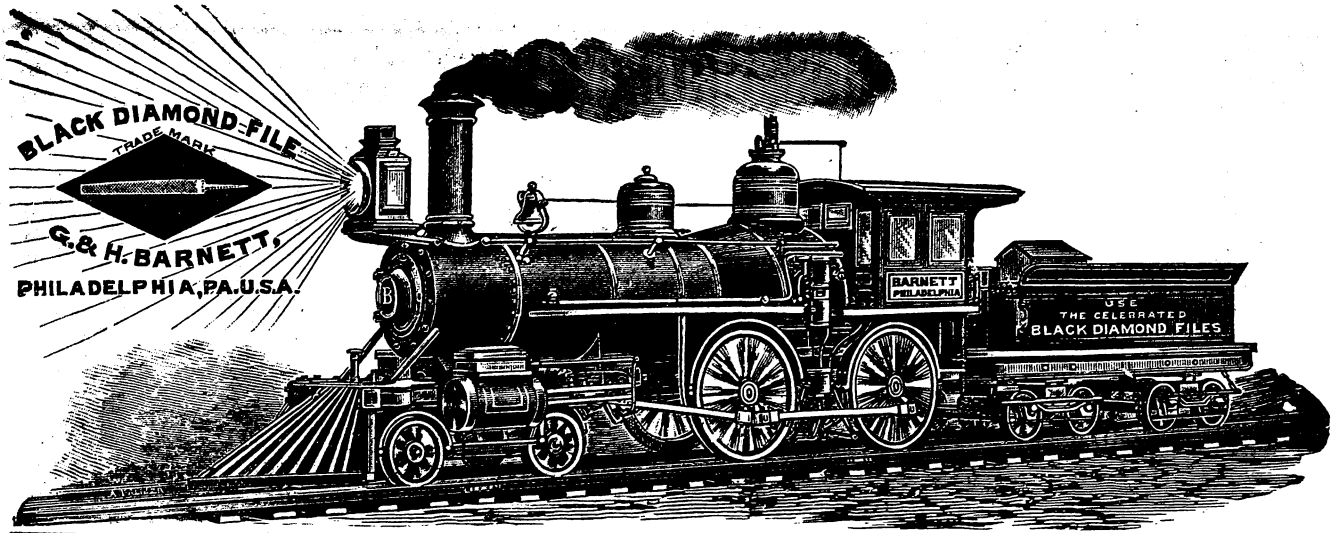
All glass men are familiar with this tool.

**BRISTOL, CONN.**



**WM KROGSrud,**  
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Manufacturer of  
**STEEL STAMPS**  
For Every Purpose.  
Steel Letters and Figures.  
Burning Brands, Stencils  
&c. Send for Illustrated  
Catalogue.





**J. M. KING & CO.,**  
WATERFORD, N. Y.

Manufacturers of

**BUTTON'S**

**Pat. Wire Cutter**  
**AND PLIER COMBINED.**

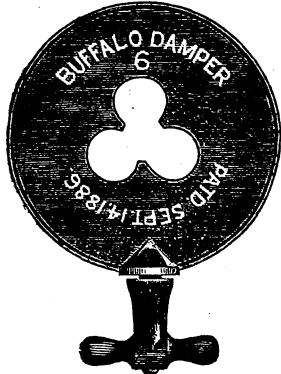
Specially Adapted for Use on Wire Fence.

Also Manufacturers of BLACKSMITHS' and  
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TAPER TAPS, HAND, NUT and SCREW  
TAPS, PIPE TAPS and REAMERS.

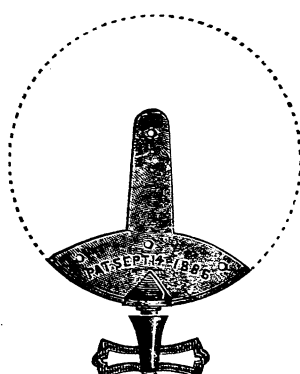
Price-List on Application.

Established by DANIEL B. KING, 1829.

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**SAVES**  
**TIME AND TEMPER.**  
**SIMPLE,**  
**SINGLE BEARING,**  
**EASILY PUT IN.**  
**ONLY ONE HOLE IN PIPE.**



### THE BUFFALO DAMPER CLIP

Indispensable to Furnace Workers. With it a Perfect Damper of any size may be easily made. Write for prices.

All DAMPERS or DAMPER CLIPS supplied with wood or metal handles, as desired.  
—SOLE MANUFACTURERS,—

**SIDNEY SHEPARD & CO.,** - **Buffalo, N. Y.**  
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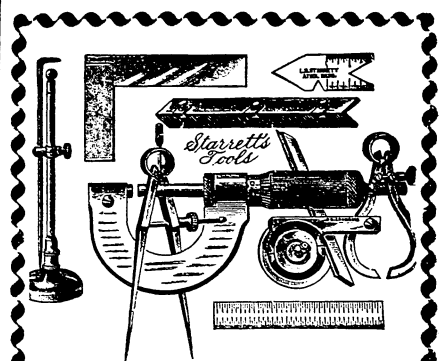
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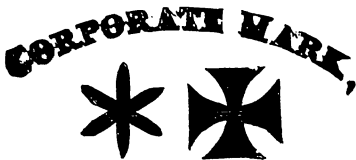
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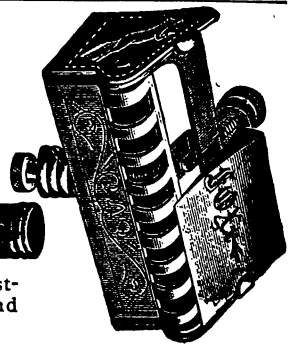
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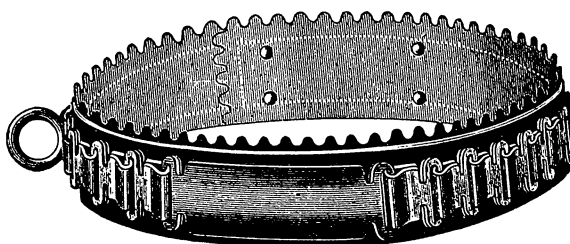
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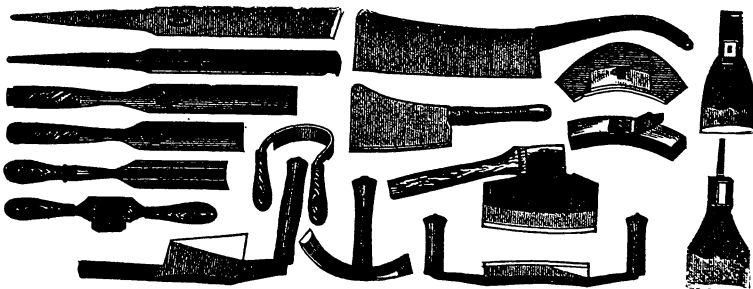
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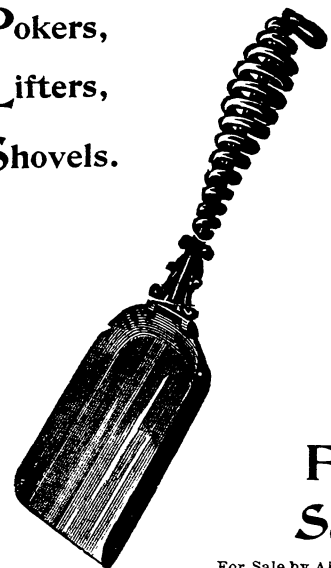
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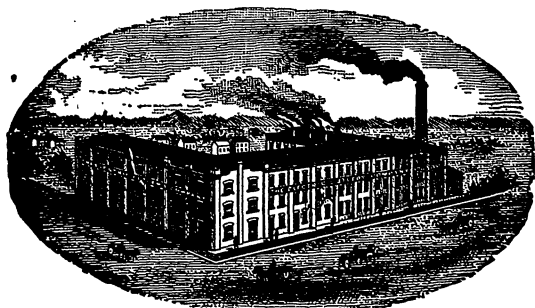
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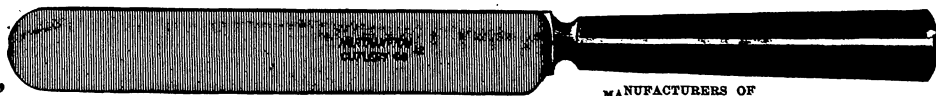
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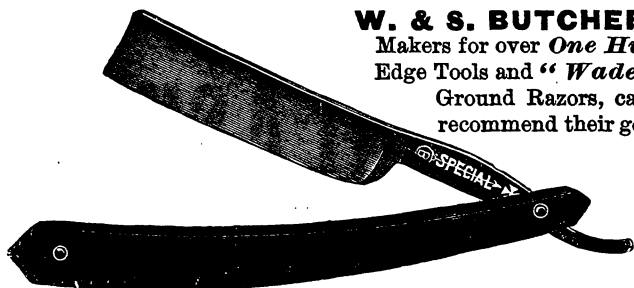
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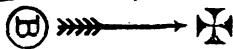
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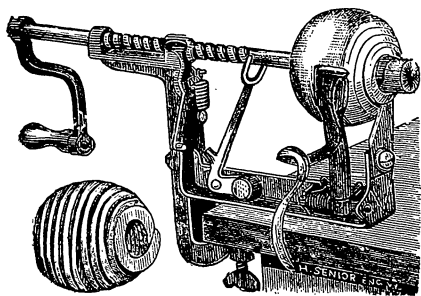
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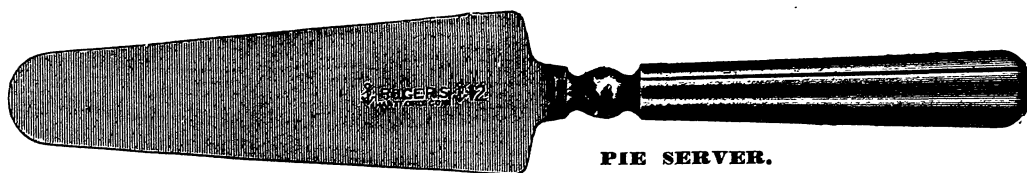


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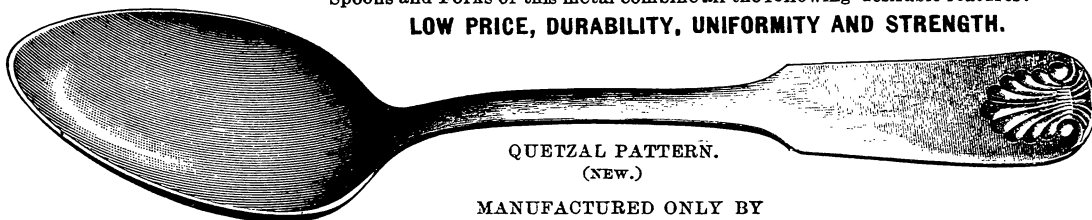
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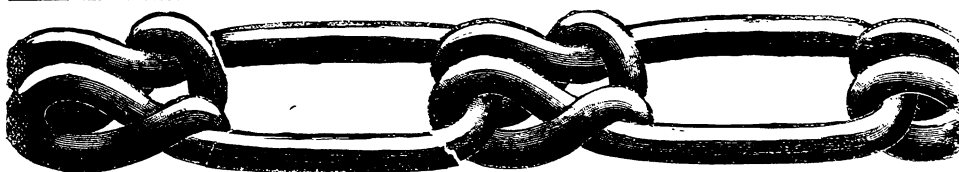
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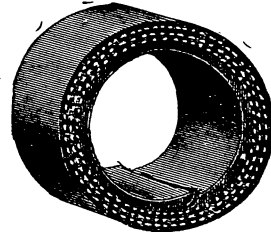
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Arranged by R. R. WILLIAMS, Hardware Editor of the Iron Age.

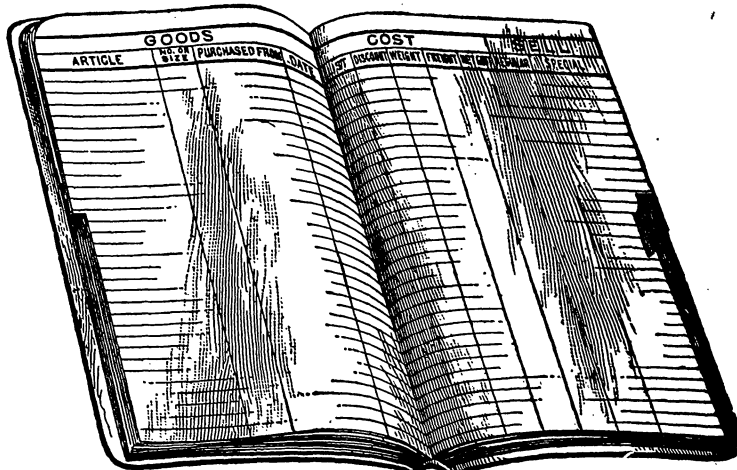
These Books are printed on paper of superior quality and bound in grain seal leather.

Columns are provided for the name and number or size, for noting from whom purchased, date of quotation or purchase, list and discount, and for entering freight expenses as an element of cost. Under the heading of selling prices, the regular and any special price or remarks in regard to the goods are given place. This book goes into considerable detail in describing the goods and cost prices. It has been arranged in accordance with the views of many Hardwaremen whose methods are careful and exact.

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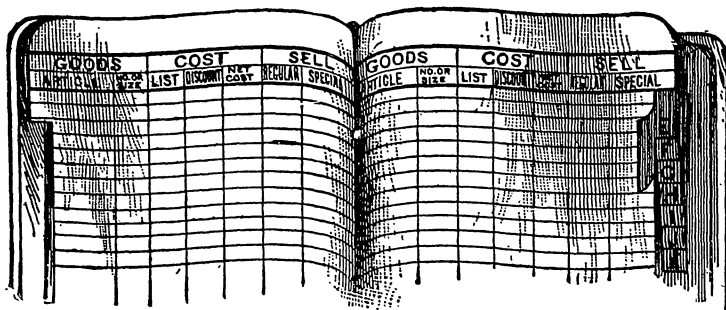
Hardware Price Book A.

In this book each page is complete, and the record of prices does not, as in Book A, run across two pages. Thus it accommodates a larger range of goods with much less detail in the record. It is adapted for office or store use, and by the use of familiar abbreviations, sufficiently large for the convenient and concise record of prices.

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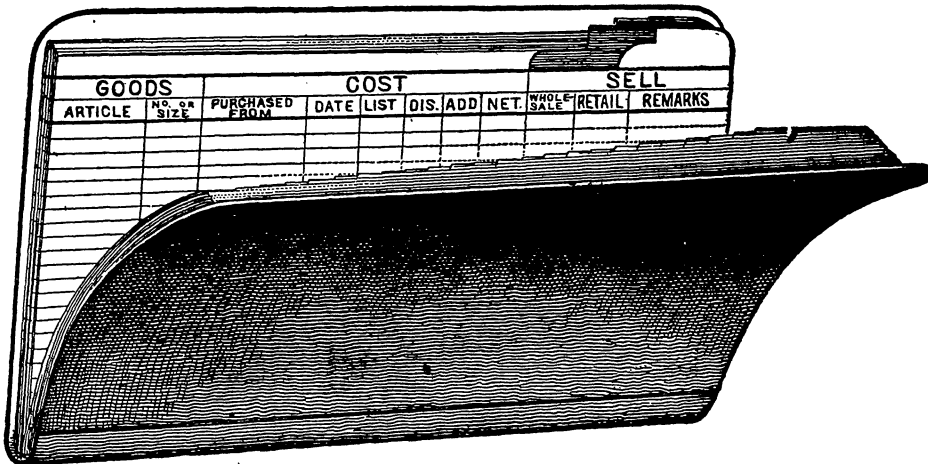
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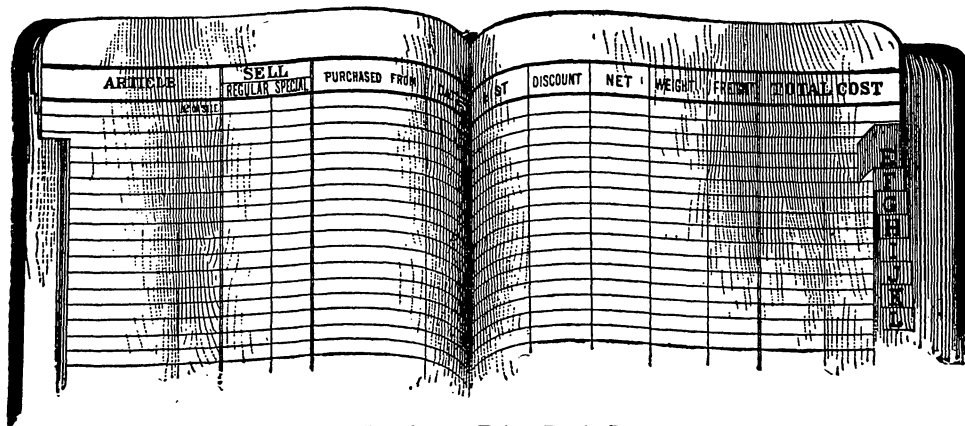
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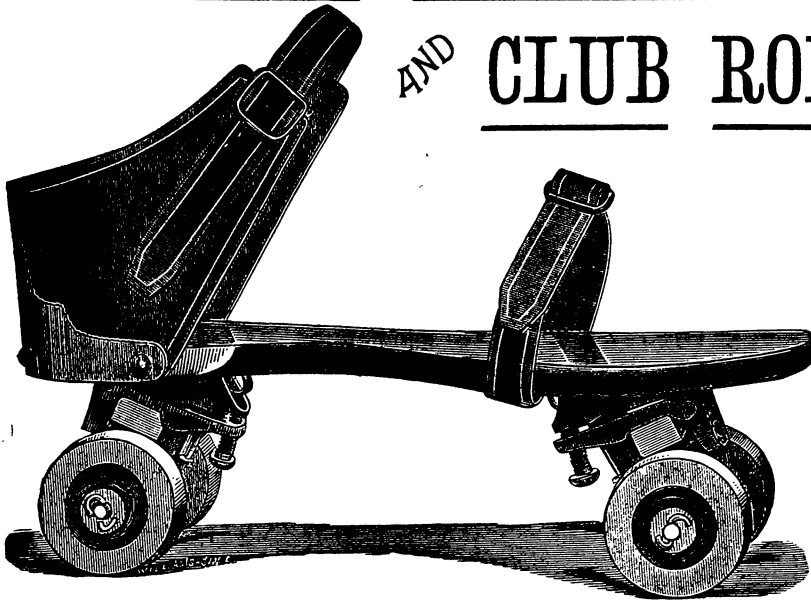
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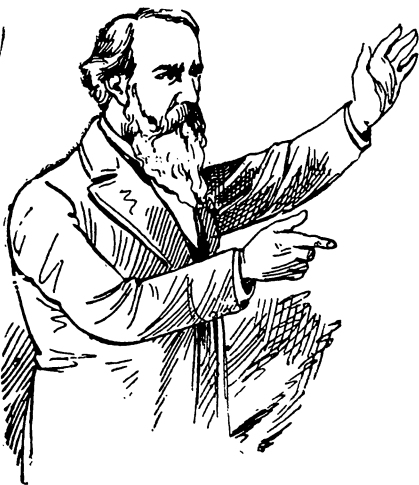


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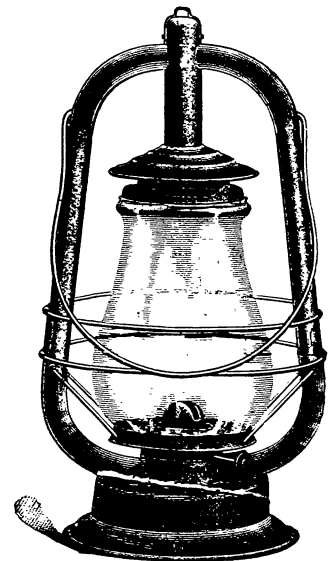


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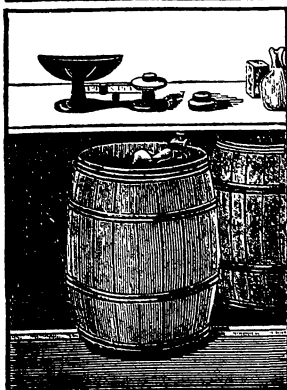
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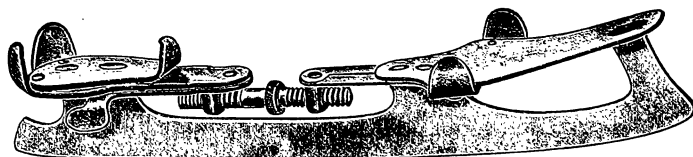
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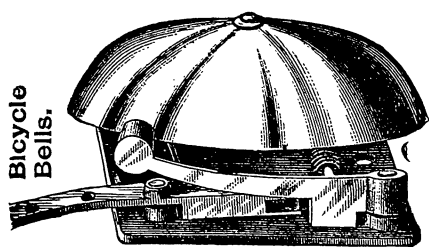
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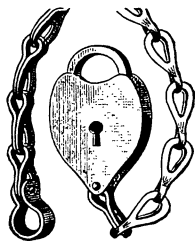


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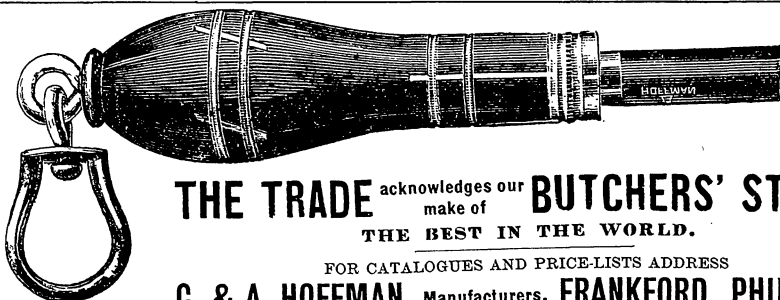
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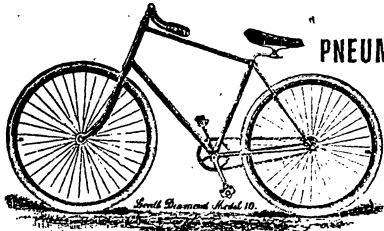
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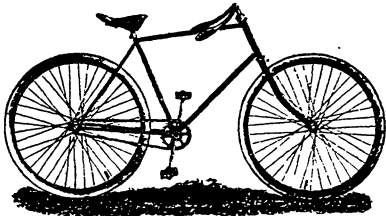
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PNEUMATIC, CUSHION AND SOLID TIRES.  
FOR LADIES AND GENTLEMEN.  
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### MANF'TRS

From \$20

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Properly Designed,  
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### FALCON JUNIOR, for Boys.

### FALCON JUNIOR COMBINATION, for Boys and Girls.

The only high grade juvenile wheels made. Full ball bearings, perfectly dust proof,  $1\frac{1}{2}$  in. pneumatic tire, 24 in. wheels, graceful drop handle bars, combination cork and rubber handles.

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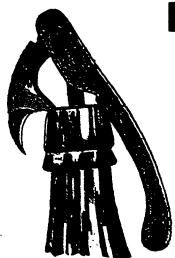


FIG. 8. Showing Davis cork-screw and fulcrum in position to pull cork.

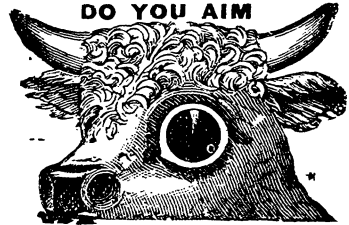
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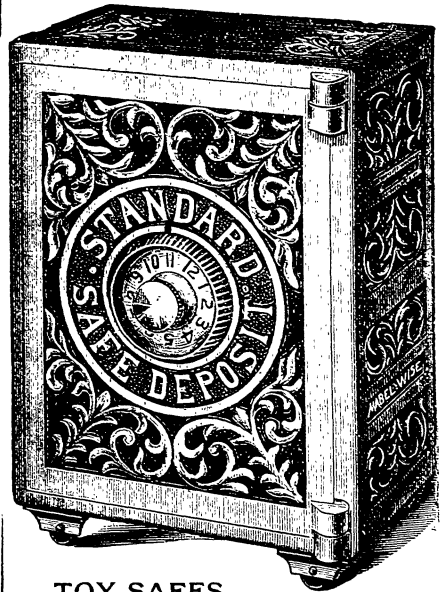
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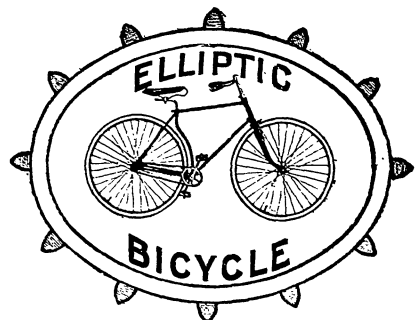
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1-2 " standing start,	:58 3-5	
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1 " standing start,	2:04 3-5	

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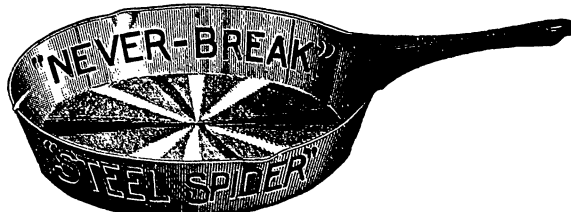
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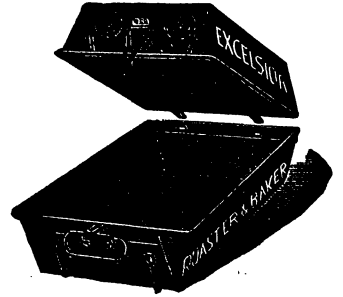
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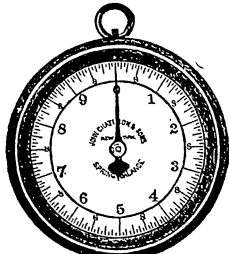


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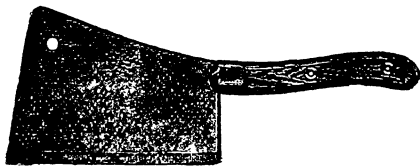
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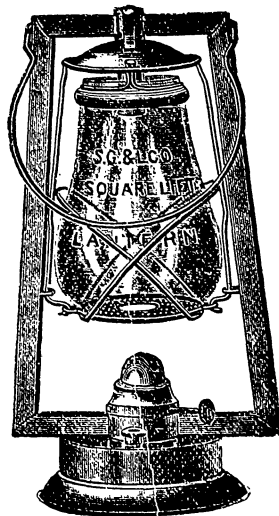
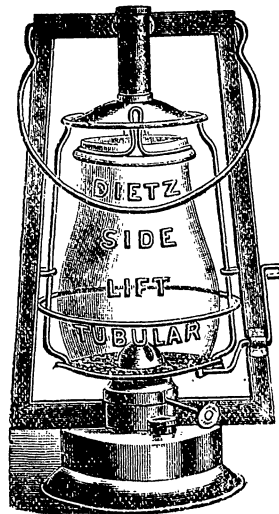
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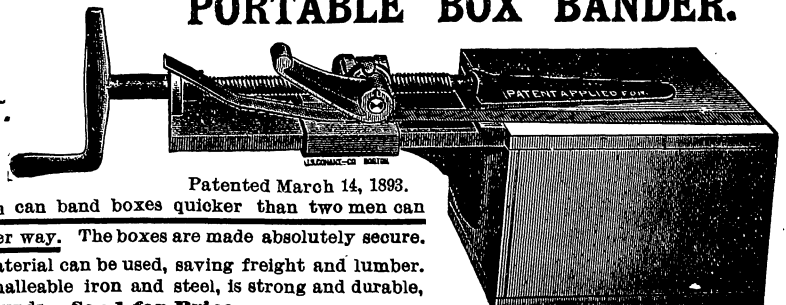
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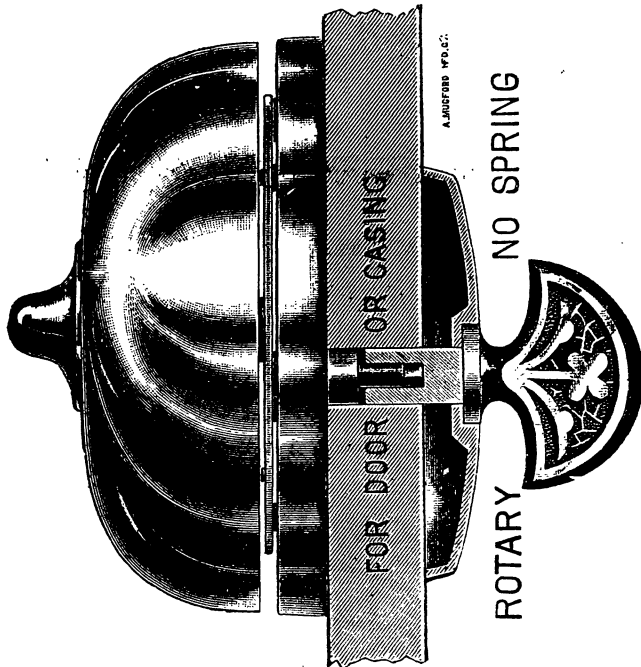
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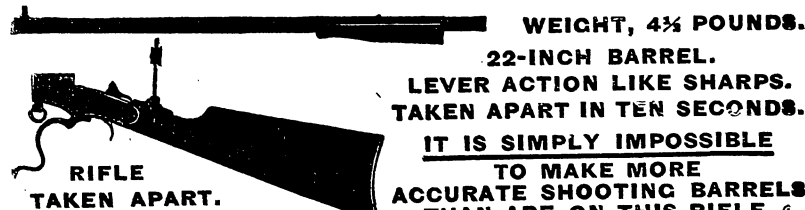
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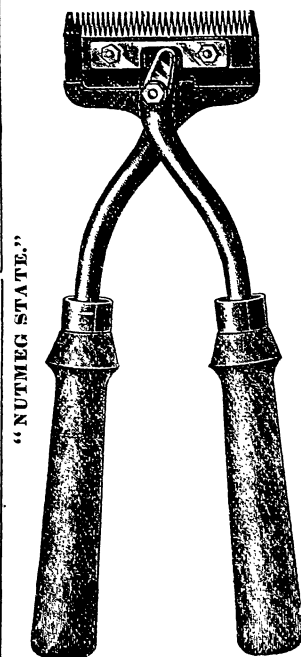


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place to place  
without going  
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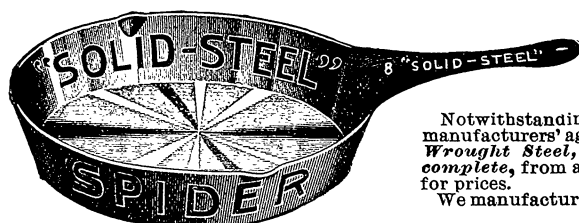
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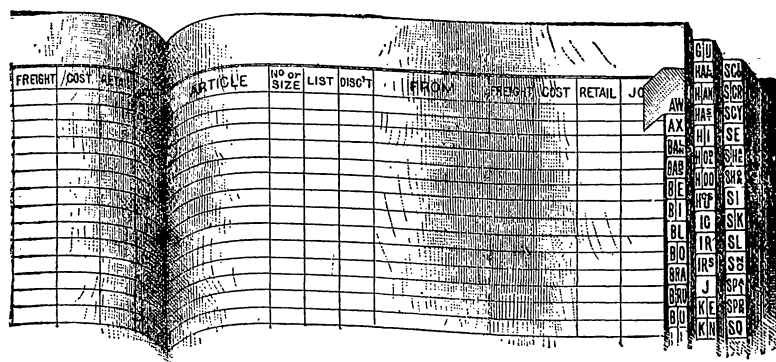
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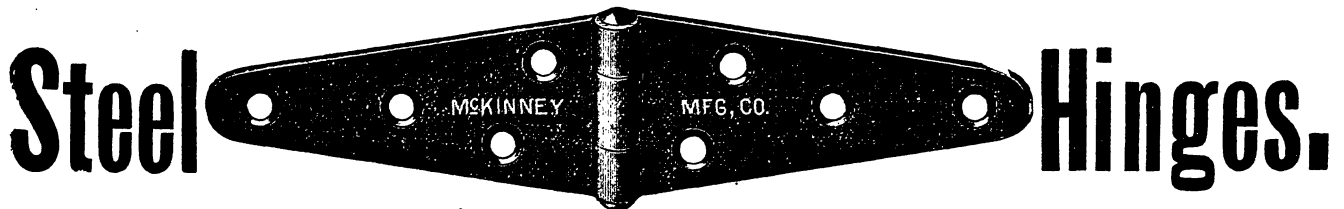
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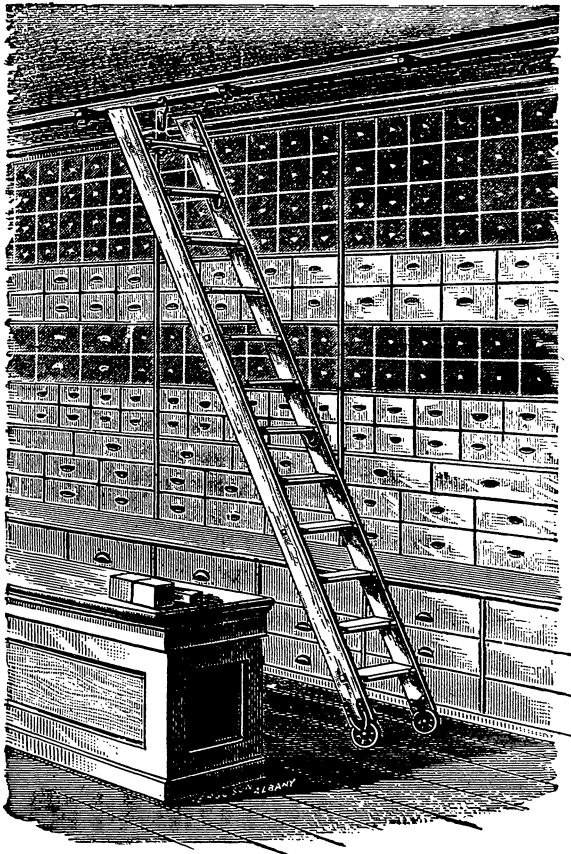
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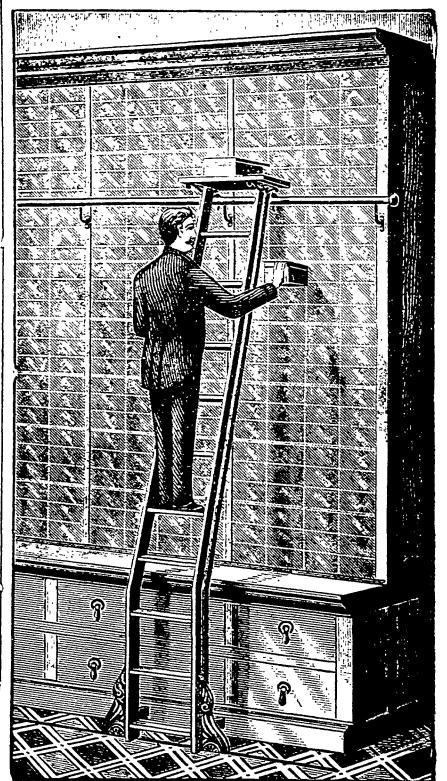
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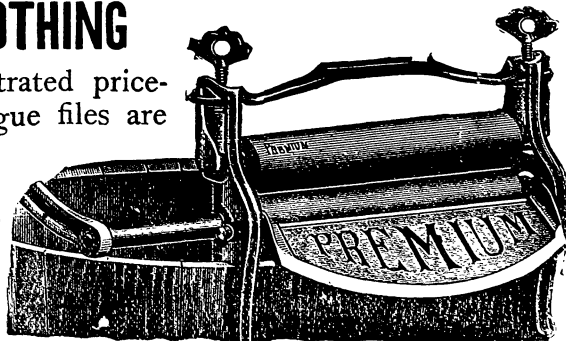
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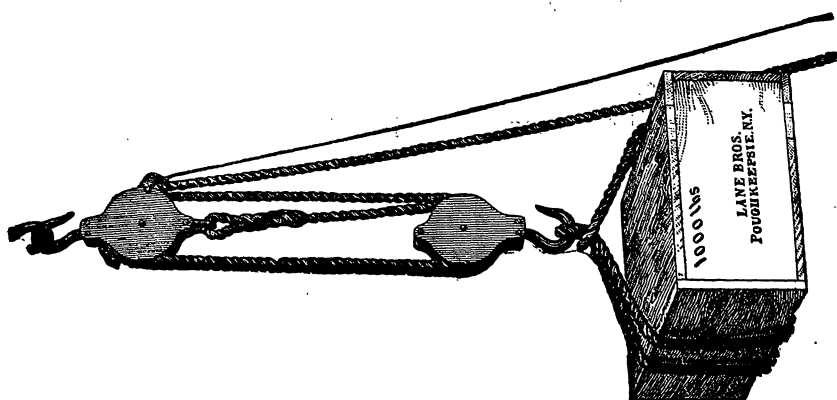
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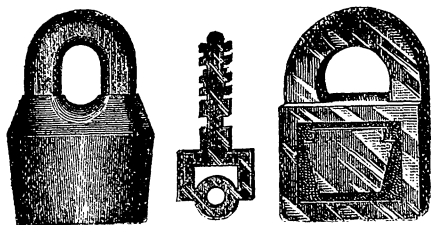
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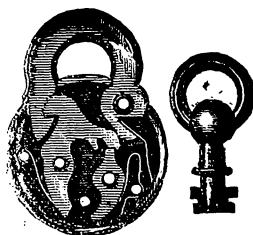
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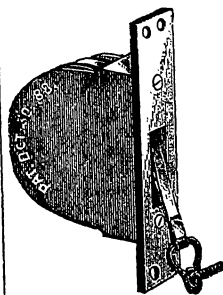
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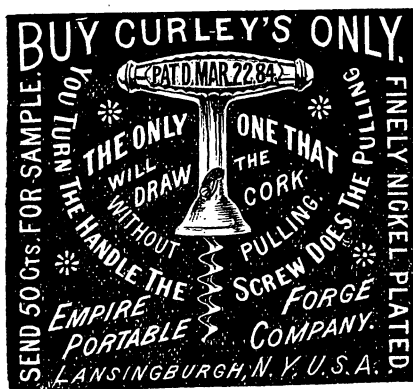


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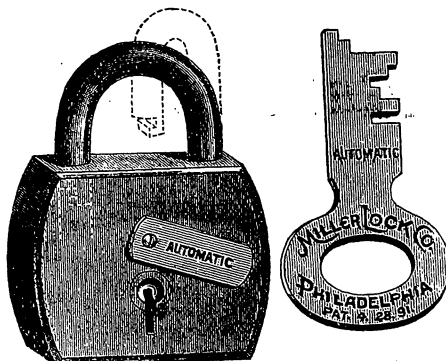
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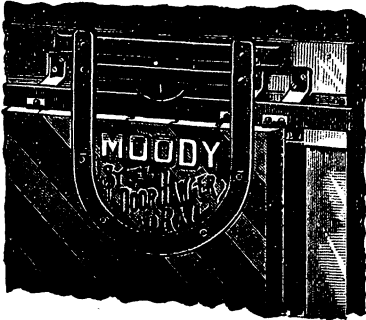
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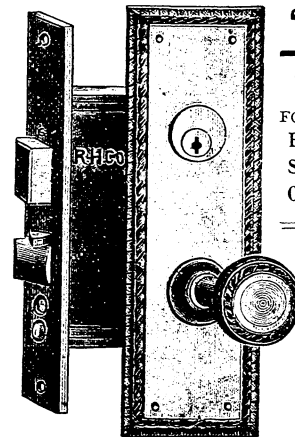
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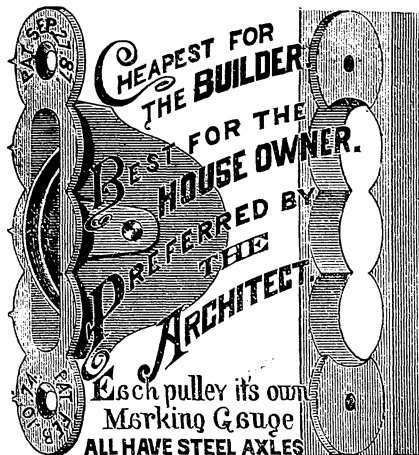
81 Reade St., New York.

514 Commerce St., Philadelphia.

73 Wabash Ave., Chicago.

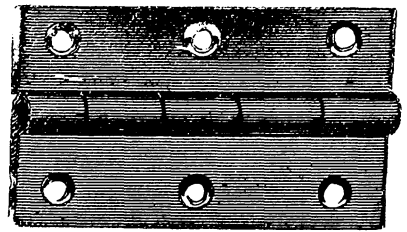
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## Palmer's Common Sense Frame Pulley.



MANUFACTURED BY

PALMER HARDWARE MFG. CO., Troy, N. Y.



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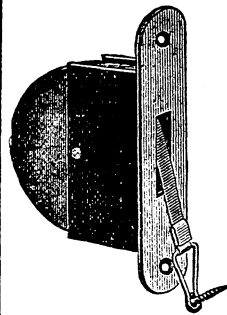
W. &amp; J. TIEBOUT,

Nos. 16 &amp; 18 Chambers Street, New York,

MANUFACTURERS OF

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with Architects, Builders,  
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tions.Simple, economical,  
and low in price.By using a steel  
frame our balance is  
much superior to  
other makes.Can be applied to  
old as well as new win-  
dows.Requires no box  
frames.

Warranted 15 years.

Cord lasts 5 years.

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The Best and most Practical  
substitute for weights invented.  
The most Durable, the Cheap-  
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ordinary windows. Balances  
when in position are out of  
sight. No rivets, bolts or  
screws are used in putting it  
together, so that nothing can  
get out of order or need repair-  
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Manufacturers of Sash Balances, Sash  
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Reliable Torches are  
what you want.Made either for Oil or  
Gasoline.

These Torches are particularly adapted for use in  
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strong white light, are free from smoke and are not  
affected by wind or rain. They are convenient and  
portable. These Torches can be run at an expense of  
about one-half cent to one cent per hour, burning a  
bright, steady light which is ten times greater than  
the light of an ordinary gas burner.  
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Manufactured by  
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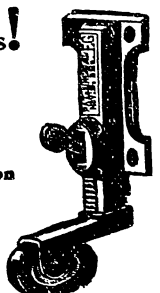
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Door Check  
Lock and  
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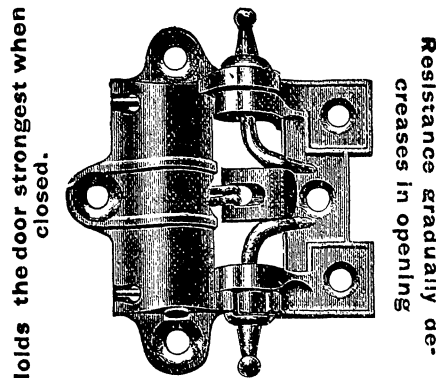
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 Pat. Jan. 20, 1880.  
*Out One-half Size.*  
 Sample pair sent to any hardware or saddlery firm by addressing  
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**ALSO SPECIAL FORGINGS.**

Estimates cheerfully given. Send for Catalogue

**NEW IDEA SPRING HINGE**



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 A covered (patented) hold-back Spring Hinge. Full particulars, free Sample and Prices by mentioning this paper.

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For Common Sense Pulleys is a necessity although it is claimed that each pulley is its own marker, which is true, but we can accurately mark ten while you are getting ready to use the pulley as a marker and also save a great deal of refitting. It will pay for itself the first time used. Price, \$1.25 each.



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Saves 2 cents a window in cost of material, saves time and makes a neater and better job than tying a knot. Send for prices and circulars.

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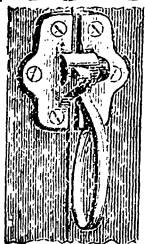
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**Refrigerator Door**

**Fasteners**

Have rapidly supplanted all others.

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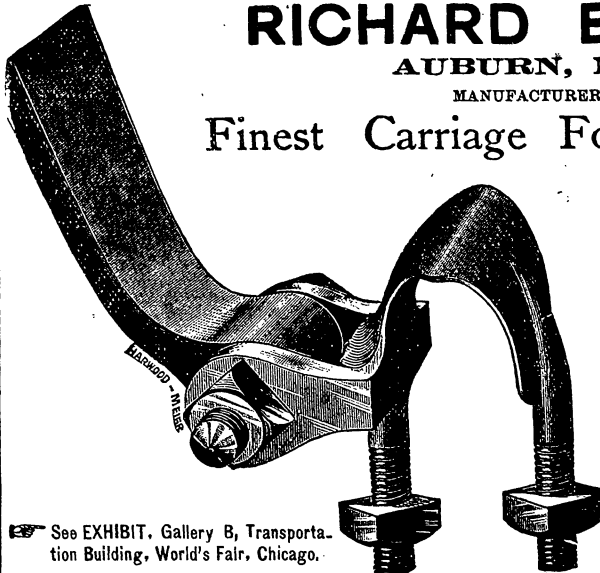
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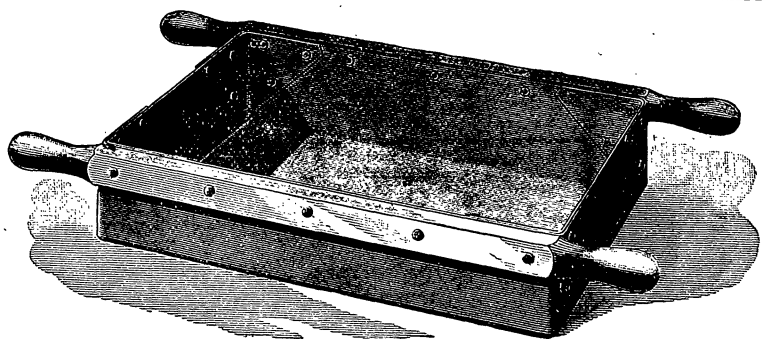
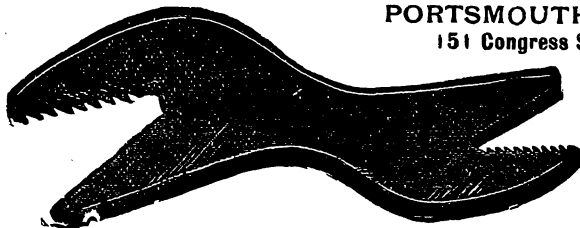
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Machinists, Carriage Makers, Blacksmiths, Mechanics, Spinners, Weavers, Carders, and in all Departments of Woolen and Cotton Mills, Farmers, Housekeepers, and in fact everybody that ever uses a wrench

**NEEDS THIS ONE.**



**STEEL HAND-BARROWS.**

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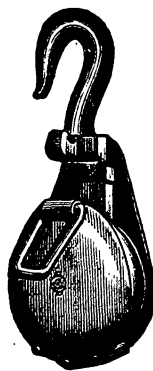
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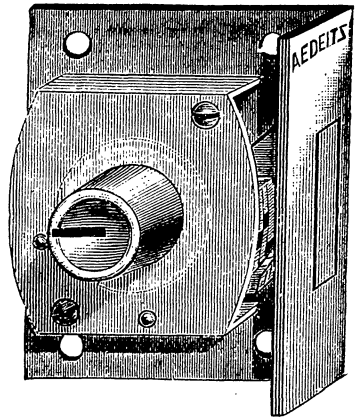
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No waste material. Every ounce of weight in the line of strength. No clumsy outside straps or bolts. As light as wooden blocks and vastly more durable. They wear, but never break. Sheaves interchangeable.

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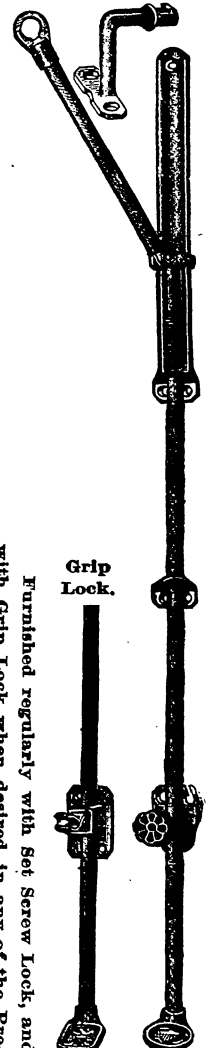
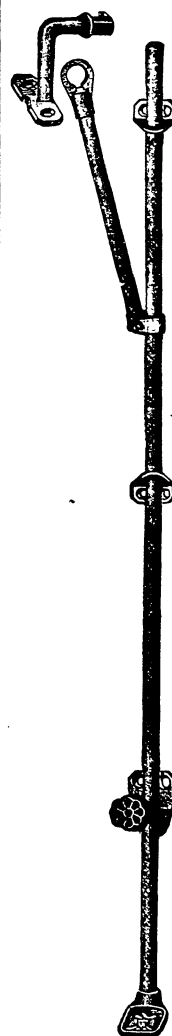
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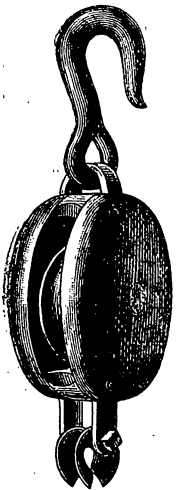
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WILL PROVE SATISFACTORY  
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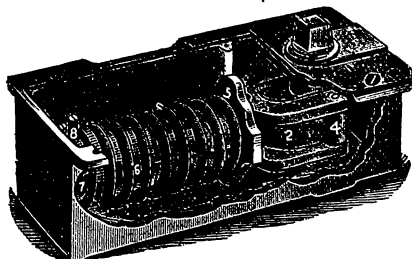
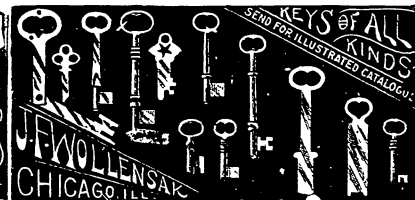


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Applied in floor under door. They close the door gently, without noise or violence and stop it at once at the centre. Doors cannot sag, springs do not break or set.

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Made of best forged Tool Steel; are easily and readily adjusted and controlled. Can be made reversible instantly without removing from their work by throwing over the lever in slot of the handle.

The Set of Combination Tools No. 1 includes the wrench, two sockets, one for screw-driver, bit or reamer shank, with wood handle, and one socket

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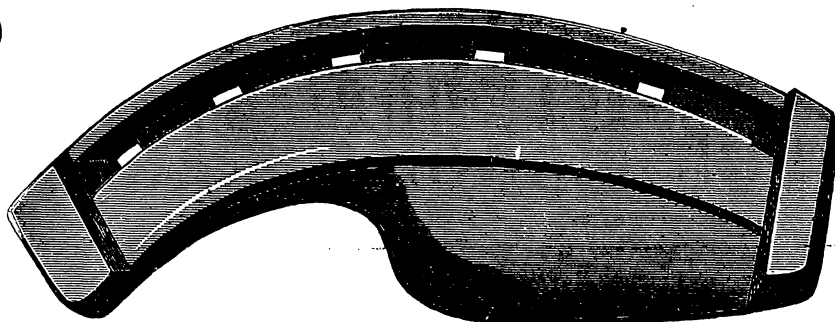
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Made under Deebie's Patent, Aug. 9, 1887.

Our 1891 pattern is a modification of the style we have made for the past four years, giving additional strength to the web.

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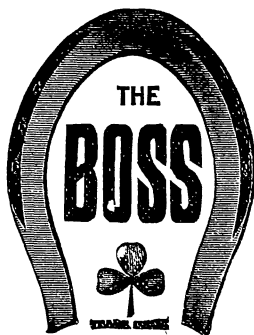
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Horse and Mule Shoes,

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CRESCENT HORSE SHOE AND  
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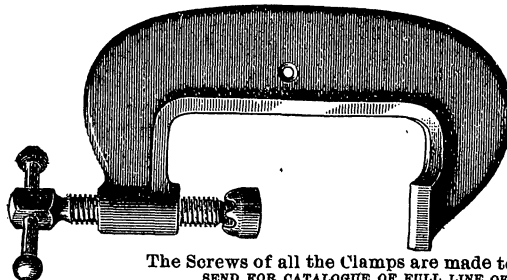
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Extra heavy, with Button on end of screw, hung on a ball so as to accommodate itself to irregularities with out bending the screw. The foot of the Clamp is planed.

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" 11, " " 18 ".....	7 00

Full Set, 11 sizes, \$40.50.

Ship or Bridge Clamp with Large Screws.  
No. 12 opens 24 inches..... price, \$12 00  
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# FORGED CARRIAGE IRONS

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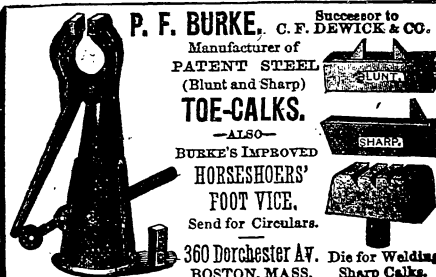
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BOSTON, MASS. Sharp Calks.




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Beautiful Shape.

HORSE SHOES,  
*Light, Medium and Heavy.*

MULE SHOES,  
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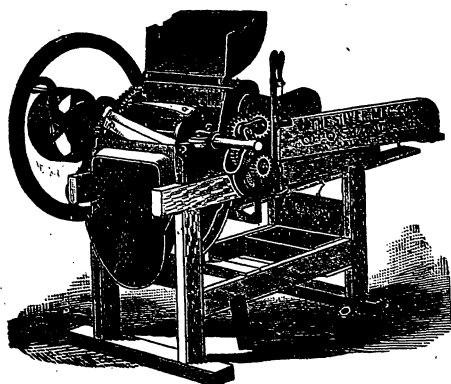
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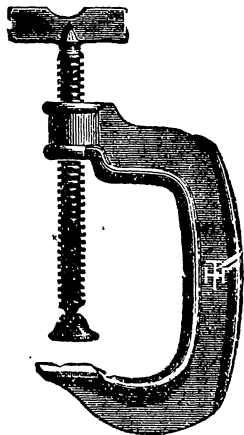
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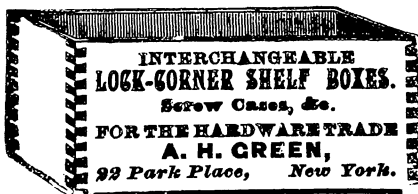
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BERGER'S PATENT TRUCKS.  
The Handiest, Cheapest and  
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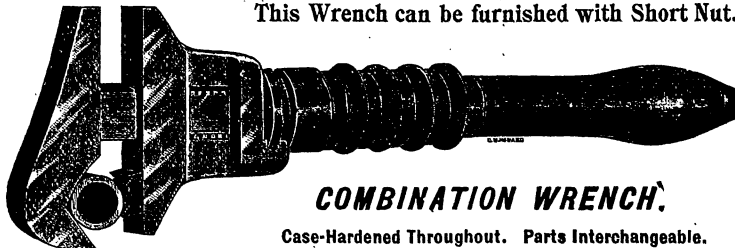
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BERGER BROS.,

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This Wrench can be furnished with Short Nut.

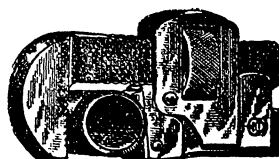


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Case-Hardened Throughout. Parts Interchangeable.

This wrench not only combines the superior qualities of a Gas Pipe Wrench but also all the  
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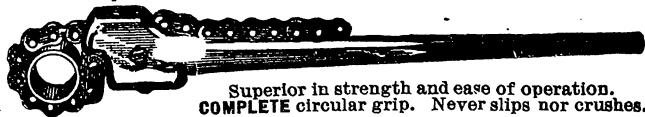
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Forged Steel.

All parts Interchangeable.

Grips firmly without loss of motion. Releases readily. Never locks. Causes no  
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TRIMO  
CHAIN  
PIPE  
WRENCH.



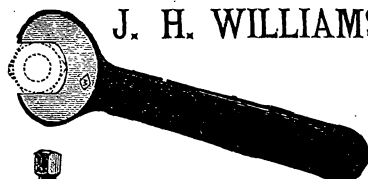
Superior in strength and ease of operation.  
COMPLETE circular grip. Never slips nor crushes.

Can be used with one  
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than any other Basin  
Wrench. Parts interchange-  
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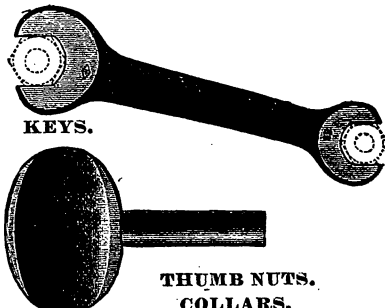
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Iron, Steel, Copper  
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Track Wrenches.



KEYS.

THUMB NUTS.  
COLLARS.

## Billings' Patent Surface Gauge.



This Surface Gauge is drop forged, of bar steel,  
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Send for Illustrated Catalogue and  
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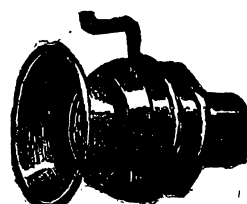
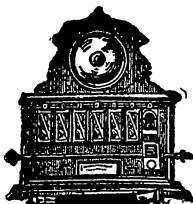
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**THE IMPROVED ACME STEEL WRENCH**

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**CAPITOL MFG. CO.,**

Cable Address: "CAPITOL, CHICAGO."

125 to 137 REES STREET,  
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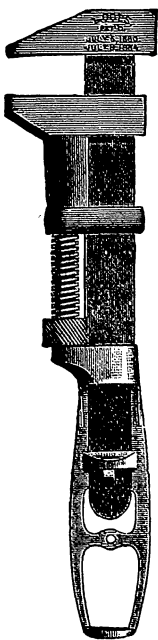
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HERCULES.  
Bright Finish.HERCULES.  
Combination Pipe, Bolt and  
Nut Wrench. Bright Finish

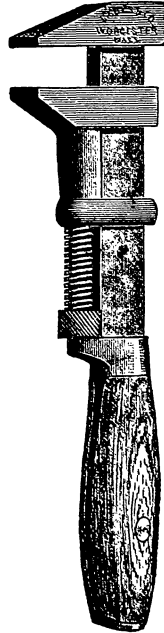
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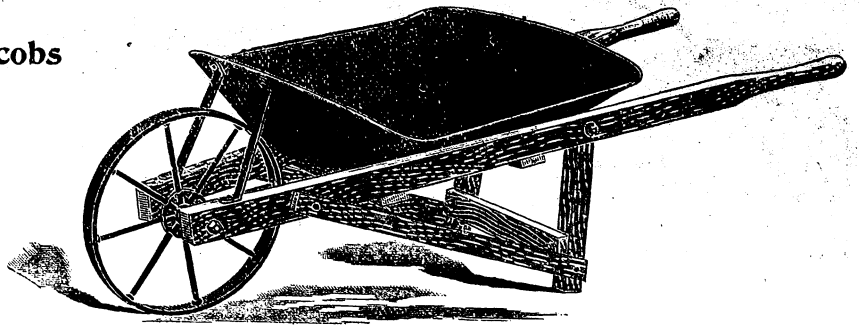
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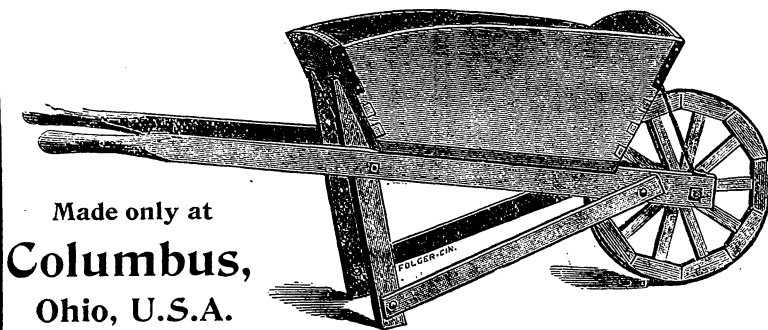
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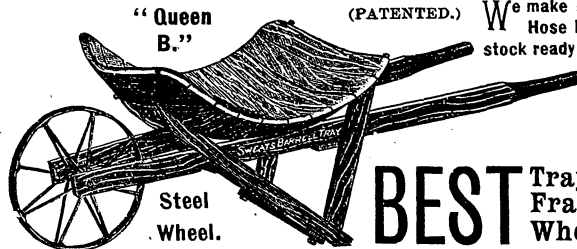
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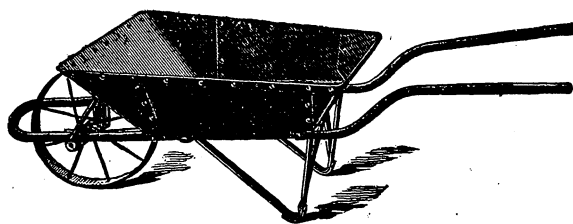
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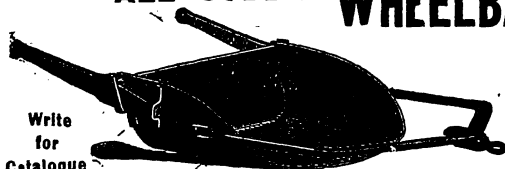
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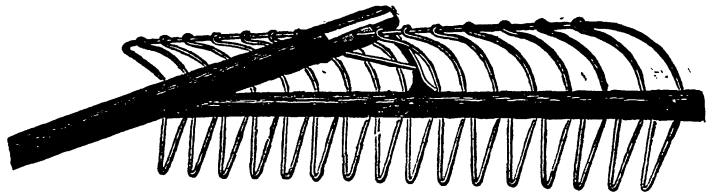
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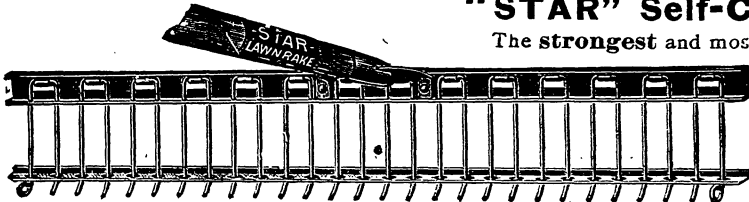
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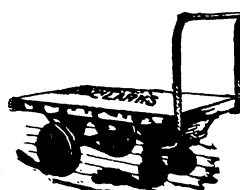
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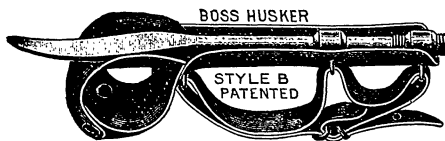
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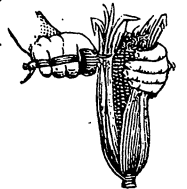
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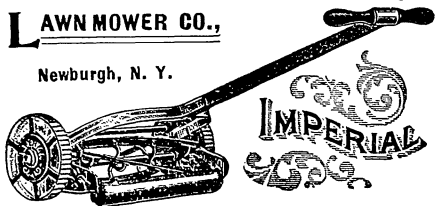
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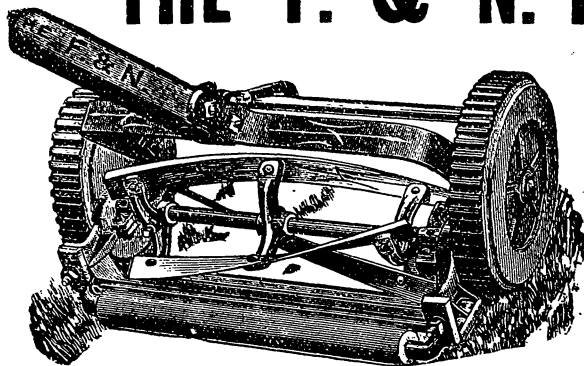
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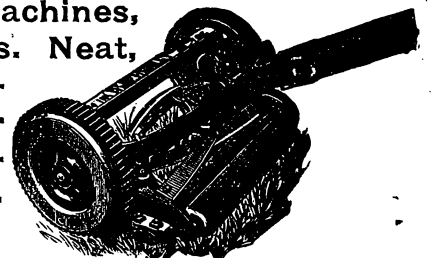
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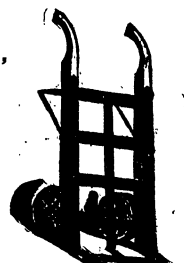
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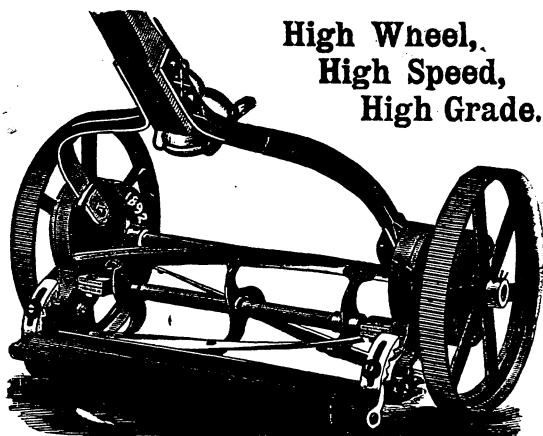
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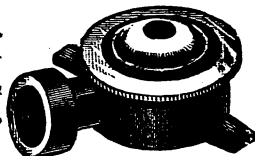


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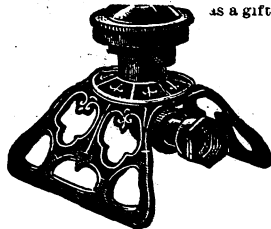


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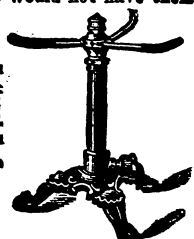


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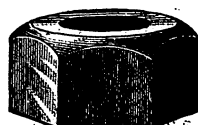
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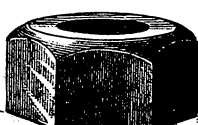
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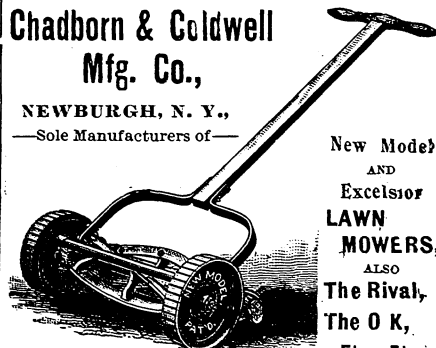
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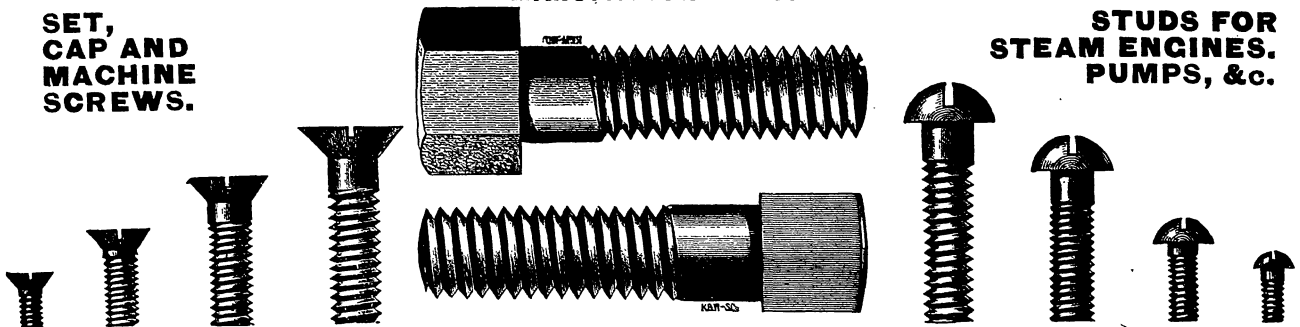
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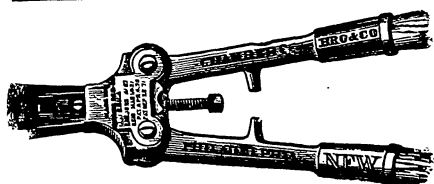
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Cleveland Block Co., Cleveland, O.  
Fulton Iron & Engine Works, Detroit, Mich.  
Shubert & Cottingham, Philadelphia, Pa.  
Toledo Block Works, Toledo, O.

## Blowers.

Buffalo Forge Co., Buffalo, N. Y.  
Champion Blower & Forge Co., Lancaster, Pa.  
Sturtevant, B. F. & Co., Boston, Mass.

## Boiler Plates.

Carbon Steel Co., Pittsburgh, Pa.  
McIlvain, Wm. & Sons, Reading, Pa.  
Lukens Iron & Steel Co., Coatsville, O.  
Pottstown Iron Co., Pottstown, Pa.

## Boilers, Copper.

Randolph & Clowes, Waterbury, Conn.

## Boilers, Steam.

Babcock & Wilcox Co., 80 Cortlandt, Edge Moor Iron Co., Wilmington.  
Harrison Safety Boiler Wks., Phila., Pa.  
Phoenix Iron Works Co., Meadville, Pa.  
Pollock, W. B. & Co., Youngstown, O.  
Southwark Fdy. & Mch. Co., Phila., Pa.  
Wetherill, Robt. & Co., Chester, Pa.

## Bolt Cutters.

Chambers Bros. Co., Philadelphia.  
Howard Iron Works, Buffalo, N. Y.  
Reece, Edw. F., Greenfield, Mass.  
Wells Bros. Co., Greenfield, Mass.  
Wiley & Russell Mfg. Co., Greenfield, Mass.

## Books.

Marine Review, Cleveland, Ohio.  
Williams, David, 96-102 Reade, N. Y.  
Wolcott & West, Syracuse, N. Y.

## Box Sander.

Goodell, J. W., Burlington, Vt.

## Boxes, Hdwr. Shelf, &c.

Green, A. H., 22 Park Place, N. Y.  
Jones, Jesse & Co., Philadelphia, Pa.

## Box Straps and Corners.

Buffalo Specialty Mfg. Co., Buffalo, N. Y.

## Brackets.

Atlas Mfg. Co., New Haven, Conn.

## Brake Shoes.

Sargent Co., Chicago, Ill.

## Brass, Manufacturers of.

Ansonia Brass & Copper Co., N. Y.  
Daval, John & Sons, 100 John, N. Y.  
Holmes, Booth & Hayden, N. Y.  
Plume & Awood Mfg. Co., N. Y.  
Randolph & Clowes, Waterbury, Conn.  
Scovill Mfg. Co., Waterbury, Conn.  
Waterbury Brass Co., 298 B'way, N. Y.

## Brass Butt Hinges.

Tiebout, W. & J., 16 & 18 Chambers.

## Brass Foundries.

Best, Fox & Co., Pittsburgh, Pa.  
Bridgeport Deoxidized Bronze & Metal Co., Bridgeport, Conn.  
Cramp, Wm. & Sons, 3 & E. B. Co., Philadelphia, Pa.  
Emory, P. F. Mfg. Co., Springfield, Mass.  
Haight & Clark, Albany, N. Y.  
Keys, W. W. & R. M. Co., Bridgeport, Conn.  
North Bros. Mfg. Co., Phila., Pa.  
Reeves, Paul S., Philadelphia.

## Brass Goods.

Brass Goods Mfg. Co., 88 Chambers.

## Bridge Builders.

Berlin Iron Bridge Co., East Berlin, Ct.  
Boston Bridge Works, Boston, Mass.  
Wrought Iron Bridge Co., Canton, O.

## Bronze (Tobin).

Ansonia Brass & Copper Co., 19-26 Cliff Street, N. Y.

## Builders' Hardware.

Belts, A. E., 97 Chambers St., N. Y.  
Reading Hdwr. Co., Reading, Pa.  
Yale & Towne Mfg. Co., Stamford, Ct.

## Butchers' Steel.

Chatillon, John & Sons, 85-89 Cliff St., N. Y.  
Hoffman, C. & A., Philadelphia, Pa.

## Butcher and Shoe Knives, Manufacturers of.

Chatillon, John & Sons, 85-89 Cliff St., N. Y.  
Goodell Co., Antrim, N. H.  
Wilson, John, Sheffield, England.

## Butts and Hinges.

McKinney Mfg. Co., Allegheny, Pa.  
Sabin Machine Co., Montpelier, Vt.  
Stanley Works, New Britain, Conn.  
Tiebout, W. & J., 16 Chambers, N. Y.

## Catapults and Dividers.

J. Stevens Arms and Tool Co., Chicopee Falls, Mass.  
Starrett, L. S., Athol, Mass.

## Can Makers' Tools and Machines.

Niagara Stamping and Tool Co., Buffalo, N. Y.

## Car Axles.

Roberts, A. & P. & Co., Phila.

## Carboy Stands.

Hillebrand & Wolf, Philadelphia, Pa.

## Car Wheels.

Whitney, A. & Sons, Phila.

## Carriage Hardware, Makers of.

Covert's Saddlery Works, Farmer, N. Y.  
Eccles, Richard, Auburn, N. Y.  
Scranton Forging Co., Scranton, Pa.  
Smith, H. D. & Co., Plantsville, Conn.  
Wilcox & Howe Co., Birmingham, Conn.

## Cartridge Reloading Tools.

Ideal Mfg. Co., New Haven, Conn.

## Casters, Wheel, &c.

Clark, G. P., Windsor Locks, Conn.

## Castings, Iron and Steel.

Ames Sword Co., Chicopee, Mass.  
Arcade Malleable Iron Co., Worcester, Mass.  
Aschman Steel Casting Co., Thurlow, Pa.  
Booth, The Lloyd, Co., Youngstown, O.  
Burgess & Loxley, Buffalo, N. Y.  
The Burr & Houston Co., Brooklyn, N. Y.  
Cambria Steel—Cambria Iron Co., Johnstown, Pa.  
Cheney, S. & Son, Manlius, N. Y.  
Chester Steel Casting Co., Phila.  
Chrome Steel Works, Brooklyn, N. Y.  
Dayton Malleable Iron Co., Dayton, O.  
Ette & Henger Mfg. Co., St. Louis, Mo.  
Eureka Cast Steel Co., Chester, Pa.  
Flagg, Stanley G. & Co., Phila.  
Gartland Foundry Co., Cleveland, O.  
Haight & Clark, Albany, N. Y.  
Hammer & Co., Branford, Conn.  
Herrick, J. A., 284 Pearl St., N. Y.  
Johnson Foundry Co., Johnstown, Pa.  
Johnson, L. G. & Co., Spuyten Duyvil, Mahoning Fdry & Mch. Co., Danville, Pa.  
Northwest Malleable Iron Co., Milwaukee, Wis.

## Castings, Steel.

Palmer & De Mooy, Cleveland, O.  
Passaic Art Casting Co., Passaic, N. J.  
Penna. Diamond Drill & Mfg. Co., Birdsboro, Pa.  
Peerless Fdry Co., Philadelphia, Pa.  
Sargent Co., Chicago, Ill.  
Sessions Foundry Co., Bristol, Conn.  
Sessions, L. S., Sons, Guilford, Conn.  
Standard Fdy. & Mfg. Co., Cleveland, O.  
Standard Steel Casting Co., Thurlow, Pa.  
Taylor Iron & Steel Co., High Bridge, N. J.  
Totten & Hogg Iron & Steel Fdry Co., Pittsburgh, Pa.  
Trenton Mal. Iron Co., Trenton, N. J.  
Union Mfg. Co., 103 Chambers St., N. Y.  
West Coxsackie Iron Fdry, Coxsackie, N. Y.  
Wetherill, Robt. & Co., Chester, Pa.

## Chains.

Bradlee & Co., Philadelphia.  
Bridgeport Chain Co., Bridgeport, Conn.  
Link-Belt Engineering Co., Phila., Pa.  
McKay, Jas. & Co., Pittsburgh, Pa.

## Chimneys.

Phila. Engineering Works, Phila., Pa.

## Chisels, Manufacturers of.

Buck Bros., Millbury, Mass.  
White, L. & I. J. Co., Buffalo, N. Y.

## Chucks.

Cushman Chuck Co., Hartford, Conn.  
Hogson & Pettis Mfg. Co., New Haven, Conn.  
Horton, E. & Sons Co., Windsor Locks, Conn.  
Smith & Egge Mfg. Co., Bridgeport, Skinner Chuck Co., New Britain, Conn.  
Union Mfg. Co., 103 Chambers, N. Y.  
Whitton, D. E. Mach. Co., New London, Conn.

## Clamps.

Hammer & Co., Branford, Conn.  
Le Count, C. W., So. Norwalk, Conn.

## Clipping Machines.

Hotchkiss, E. S., Bridgeport, Conn.  
McCoy, Jos. F. & Co., 26 Warren St.

## Coal.

Barns, C. K. & Co., Philadelphia, Pa.  
Wister, Francis, Philadelphia, Pa.

## Coke.

Barns, C. K. & Co., Philadelphia, Pa.  
Houston, C. B. & Co., Philadelphia, Pa.  
Rainey, W. J., Cleveland, O.  
Sibell, Geo. H. & Co., Chicago, Ill.  
Wister, Francis, Philadelphia, Pa.

## Condensers.

Worthington, Henry R., 86 & 88 Liberty Street, N. Y.

## Conveying Machinery.

Brown Holsting & Conveying Machine Co., Cleveland, Ohio.  
Jeffrey Mfg. Co., Columbus, O.  
Link Belt Engineering Co., Phila., Pa.

## Copper.

Ames Sword Co., Chicopee, Mass.  
Ansonia Brass & Copper Co., 19 and 23 Cliff, N. Y.  
Hendricks Bros., 49 Cliff, N. Y.  
New Haven Copper Co., 294 Pearl, N. Y.  
Randolph & Clowes, Waterbury, Conn.  
Wister, Francis, Philadelphia, Pa.

## Coppersmiths.

Emory, P. F. Mfg. Co., Springfield, Mass.

## Cordage.

Samson Cordage Works, Boston, Mass.

## Cork Screws.

Detroit Cork Screw Co., Detroit, Mich.  
Williamson, C. T. Wire Novelty Co., Newark, N. J.

## Corn Huskers.

Boss Mfg. Co., Kewanee, Ill.  
Hall & Ross Husking Globe Co., Chicago, Ill.  
Moore & Wickert, Green River, Ohio.

## Corrugated Furnaces.

Continental Iron Wks, Brooklyn, N. Y.

## Corrugated Iron.

Cambridge Roofing Co., Cambridge, O.  
Moseley Iron Bridge & Roof Co., 6 Dey, N. Y.

## Counting Machines.

Durant, W. N., Milwaukee, Wis.  
Osborn, G. Edw. & Co., New Haven, Ct.

## Coupling.

Almond, T. R., Brooklyn, N. Y.

## Coverings, Boiler and Pipe.

Johns, H. W. Mfg. Co., 87 Maiden Lane.

## Cranes.

Detroit Foundry Equipment Co., Detroit, Mich.  
Maris & Beekley Philadelphia, Pa.  
Ridgway, Craig & Sons, Coatesville, Pa.  
Sellers, Wm. & Co., Inc., Phila., Pa.  
Yale & Towne Mfg. Co., Stamford, Conn.

## Cupolas, Hot-Blast.

Colliau, Victor, Detroit, Mich.  
Detroit Fdry. Equipment Co., Detroit, Mich.

## Curry Combs.

Kohler, F. E. & Co., Canton, O.

## Cutlery Cases.

Torrey, J. K. & Co., Worcester, Mass.

## Cutlery, Importers of.

Field, Alfred & Co., 83 Chambers St., New York.  
Gurney, Fred B., 116 Chambers St., N. Y.  
Sickles, Sweet & Lyon, 35 Barclay, N. Y.

## Cutlery, Manufacturers of.

Curley, J. & Bro., 8 Warren St., N. Y.  
Dane, Stoddard & Kendall, Boston, Mass.  
Electric Cutlery Co., 113 Chambers, N. Y.  
Goodell Co., Antrim, N. H.  
Northampton Cutlery Co., Northampton, Mass.  
Schmaeternberg Bros., 98 Chambers Street, N. Y.  
Wilson, John, Sheffield, England.

## Cutting-off Tools.

Hurley Bros., Hartford, Conn.

## Dampers.

Shepard, Sidney & Co., Buffalo, N. Y.

## Designer, Metal Work.

Arnold, F. H., New Britain, Conn.

## Dies.

Wilson, J. Fred, Worcester, Mass.

## Dog Collars.

Chapman Mfg. Co., Meriden, Conn.  
Kelley & Woolworth, Niagara Falls, N. Y.

## Door Bells.

Graham, Jno. H. & Co., 113 Chambers St., N. Y.

## Door Checks.

Utility Door Check Co., Chicago, Ill.

## Door Knobs.

Bardsley, J., 149 & 151 Baxter St., N. Y.

## Drilling Machines.

Bickford Drill & Tool Co., Cinn., Ohio.  
Buffalo Forge Co., Buffalo, N. Y.  
Burnham, Geo. Co., Worcester, Mass.  
Champion Blower and Forge Co., Lancaster, Pa.  
Colburn, A. M., New Haven, Conn.  
Dallett, Thos. H. & Co., Philadelphia.  
Dwight Slate Machine Co., Hartford, Conn.  
Halsey, Jas. T., Philadelphia, Pa.  
Hamilton Mch. Tool Co., Hamilton, Ct.  
Illinois Iron and Bolt Co., Carpenterville, Ill.  
Norton & Jones Machine Tool Works, Plainville, Conn.  
Quint, A. D., Hartford, Conn.  
Sellers, Wm. & Co., Inc., Phila., Pa.  
Sibley & Ware, So. Bend Ind.  
Sikourney Tool Co., Hartford, Conn.  
Silver Mfg. Co., Salem, O.  
Smith Friction Drill & Tool Co., Boston, Mass.

## Drop Forgings.

Benson Mach. Co., New Haven, Conn.  
Billings & Spencer Co., Hartford, Conn.  
Boone, W. C. Mfg. Co., Boonton, N. J.  
Ecc

**Drop Presses.**

Bliss, E. W. Co., Brooklyn, N. Y.  
Crosby, G. A. & Co., Chicago, Ill.  
Miner & Peck Mfg. Co., New Haven, Conn.  
Sutles & Parker Press Co., Brooklyn, N. Y.  
Vulcan Iron Works, Chicago, Ill.  
Waterbury Farrel Foundry and Machine Co., Waterbury, Conn.

**Dumb Waiters.**

Storm Mfg. Co., Newark, N. J.

**Dust Beaters.**

Peabody & Parks, Troy, N. Y.

**Dynamite.**

New York Powder Co., 62 Liberty St., N. Y.

**Dynamos.**

C. & C. Electric Motor Co., 402 and 404 Greenwich St., N. Y.  
Lovell Mfg. Co., Ltd., Erie, Pa.  
Zucker & Levest Chemical Co., 10 W. 14 Grand St., N. Y.

**Edge Tools. Makers of.**

Suck Bros., Millbury, Mass.  
Butcher, W. & S., 135 Duane St., N. Y.  
Buffalo Edge Tool Wks., Buffalo, N. Y.  
Plumb, Fayette R., Philadelphia, Pa.  
White, L. & I. J. Co., Buffalo, N. Y.

**Egg Beaters.**

North Bros. Mfg. Co., Philadelphia.

**Electric Bells and Supplies.**

Ostrander, W. R. & Co., 204 Fulton St., New York  
Wellensak, J. F., Chicago, Ill.

**Electric Welding.**

Thomson Electric Welding Co., Boston, Mass.

**Electro-Platers.**

Boardman, L. & Son, East Haddam, Ct.

**Elevator Buckets.**

W. J. Clark & Co., Salem, Ohio.

**Elevators. Makers of.**

Link-Belt Engineering Co., Phila., Pa.  
Moline Elevator Co., Moline, Ill.  
Morse, Williams & Co., Phila., Pa.  
Salem Fdry & Mch. Co., Salem, Mass.

**Emery and Emery Wheels.**

Bell, Geo. E., 36 John St., N. Y.  
Grant Corundum Wheel Mfg. Co., Worcester, Mass.  
N. Y. Belting & Packing Co., Ltd., N. Y.  
Northampton Emery Wheel Co., Leeds, Mass.  
Norton Emery Wheel Co., Worcester, Mass.  
Springfield Emery Wheel Mfg. Co., Bridgeport, Conn.  
Sterling Emery Wheel Co., 174 Fulton St., New York.

**Enamels.**

Nubian Iron Enamel Co., Cragin, Ill.

**Engineers and Contractors.**

Aiken Henry, Pittsburgh, Pa.  
Artificial Gas Engineering Co., Pittsburgh, Pa.  
Carter, Henry J., Pittsburgh, Pa.  
Herrick, J. A., 284 Pearl St., N. Y.  
Kennedy, Julian, Pittsburgh, Pa.  
Laughlin, Alex. & Co., Pittsburgh, Pa.  
Lean, D. R. Co., Pittsburgh, Pa.  
McClure, A. Miller & Co., Pittsburgh, Pa.  
Pittsburgh Iron & Steel Engineering Co., Pittsburgh, Pa.  
Roberts, Frank C., Philadelphia, Pa.  
Smythe, S. R. Co., Incorporated Pittsburgh, Pa.  
Swindell, W. & Bros., Pittsburgh, Pa.  
Wilkie, Bothwell & Co., Ltd., Pittsburgh, Pa.  
Witherow, Jas. P. Co., Pittsburgh, Pa.

**Engines, Gas.**

Otto Gas Engine Works, Phila., Pa.  
Rollason Gas Engine, Havemayer Bldg., N. Y.

**Engines, Steam. Makers of.**

Pass Foundry & Machine Works, Ft. Wayne, Ind.  
Buckeye Engine Co., Salem, O.  
Erie Engine Works, Erie, Pa.  
Norwalk Iron Works Co., So. Norwalk, Conn.  
Phila. Engineering Works, Phila., Pa.  
Phoenix Iron Wks. Co., Meadville, Pa.  
Shipman Engine Co., Boston, Mass.  
Southwark Foundry and Machine Co., Phila., Pa.  
Tod, William & Co., Youngstown, O.  
Wetherill, Robt. & Co., Chester, Pa.

**Exhaust Tumblers.**

Sweeter, W. A., Brookton, Mass.

**Expansion Belts.**

Boone, W. C. Mfg. Co., Bonton, N. J.  
Church, Isaac, Toledo, O.

**Faucets, Self-Measuring.**

Lane Bros., Poughkeepsie, N. Y.

**Faucets, Wooden. Makers of.**

Boston & Lockport Block Co., Boston, Mass., and Lockport, N. Y.  
John Sommer's Son, Newark, N. J.

**Feed-Water Heaters.**

Davis, I. H. & Son, Hartford, Conn.  
Goubert Mfg. Co., 32 Cortlandt St., N. Y.  
Harrison Safety Boiler Wks., Phila., Pa.  
National Pipe Bending Co., New Haven, Conn.  
Webster, Warren & Co., Camden, N. J.  
Whitlock Coil Pipe Co., Elmwood, Conn.

**Fencing, Iron and Wire.**

Garnum, E. T., Detroit, Mich.  
Champion Iron Co., Kenton, O.  
Clinton Wire Cloth Co., Clinton, Mass.  
DeKalb Fence Co., DeKalb, Ill.  
Gilbert & Bennett Mfg. Co., 42 Cliff St., Hartman Mfg. Co., Ellwood City, Pa.  
Kilmer Mfg. Co., Newburgh, N. Y.

Meat, Foss & Co., Springfield, O.  
The Van Dorn Iron Works Co., Cleveland, O.  
Reliance Wire & Iron Wks., Milwaukee, Wis.

**Figures and Letters, Metallic.**

White, A. A. & Co., Providence, R. I.

**Files. Importers of.**

Moss, F. W., 80 John, N. Y.

**Files and Rasps, Manufacturers of.**

Banker & White, Troy, N. Y.  
Barnett, G. & H., 41 & 43 Richmond, Phila.  
Butcher, W. & S., 135 Duane St., N. Y.  
McCaffrey File Co., Philadelphia.  
Nicholson File Co., Providence, R. I.

**Fire Brick. Makers of.**

Borgner, Cyrus, Philadelphia, Pa.  
Gardner, Jas. & Son, Cumberland, Md.  
Kreischer P. & Sons, Foot E. Houston, St. Louis, Mo.  
McClelland & Henry Co., Troy, N. Y.  
Maurer, H. & Son, 420 E. 23d, N. Y.  
Ostrander Fire Brick Co., Troy, N. Y.  
Valentine, M. D. & Bro., Woodbridge.

**Fire Sets.**

Troy Nickel Works, Troy, N. Y.

**Fishing Tackle.**

Dame, Stoddard & Kendall, Boston, Mass.

**Flint and Emery Paper.**

Baeder, Adamson & Co., Phila., Pa.

**Fly Fans.**

Matthal, Ingram & Co., Baltimore, Md.

**Fodder Cutters.**

Silver Mfg. Co., Salem, O.

**Forges, Portable, &c.**

Bullock Bellows Co., Cleveland, O.  
Buffalo Forge Co., Buffalo, N. Y.  
Champion Blower & Forge Co., Lancaster, Pa.  
Empire Portable Forge Co., Lansing, Mich.  
sturtivant, B. F. Co., Boston, Mass.

**Forgings, Iron and Steel.**

Bethlehem Iron Co., S. Bethlehem, Pa.  
Cambria Steel-Cambria Iron Co., Johnstown, Pa.  
Scranton Forging Co., Scranton, Pa.

**Foundry Facings.**

Chicago Fdy. Supply Co., Chicago, Ill.  
MacKellar Foundry Facing & Supply Co., Quincy, Ill.  
Paxson, J. W. & Co., Phila.  
S. Obermayer Co., Cincinnati, O.  
Smith, J. D. Fdy. Supply Co., Cinn., O.

**Foundry Middles.**

Ester, W. S. 65 Fulton, N. Y.

**Foundry Supplies.**

Chicago Fdy. Supply Co., Chicago, Ill.  
Colliau, Victor, Detroit, Mich.  
MacKellar Fdy. Facing & Supply Co., Quincy, Ill.  
S. Obermayer Co., Cincinnati, O.  
Paxson, J. W. & Co., Philadelphia.  
Smith, J. D. Fdy. Supply Co., Cinn., O.

**Friction Clutches.**

Keystone Clutch & Mch. Wks., Phila., Pa.  
Moore & White Co., Philadelphia, Pa.

**Fruit Pickers.**

Cleveland Novelty Co., Cleveland, O.

**Fruit Presses.**

Enterprise Mfg. Co., Philadelphia, Pa.

**Gas Producers.**

Wood, R. D. & Co., Philadelphia, Pa.

**Gas & Steam Fitters' Supplies.**

Pancoast, Henry B. & Co., Phila., Pa.

**Gauge, Rolling Mill.**

Haines Gauge Co., Philadelphia, Pa.

**Gear Cutters.**

D. E. Whiton Mach. Co., New London, Conn.

**Gears.**

Boston Gear Works, Boston, Mass.  
Gleason Tool Co., Rochester, N. Y.  
New Process Raw Hide Co., Syracuse, N. Y.  
Poole, Robt. & Son Co., Baltimore, Md.  
Union Fdy. & Mch. Co., Pittsburgh, Pa.

**Glass Tubes.**

Ashcroft Mfg. Co., 111 Liberty St., N. Y.

**Glass Cutters.**

Monroe, S. G., Bristol, Conn.

**Glue.**

Baeder, Adamson & Co., Phila., Pa.  
Russia Cement Co., Gloucester, Mass.

**Grass Catchers.**

Supplee Hardware Co., Phila., Pa.

**Grinding and Polishing Machines.**

Norton Emery Wheel Co., Worcester, Mass.  
Washburn Shops, Worcester, Mass.

**Grindstone Dressing Machinery.**

Blake & Johnson, Waterbury, Conn.

**Grindstones.**

Cleveland Stone Co., Cleveland, O.

**Gunpowder, Makers of.**

Lafin & Rand Powder Co., 29 Murray St., N. Y.

**Hand Carts.**

Lansing Wheelbarrow Co., Lansing, Mich.

**Halter Chains.**

Kelley & Woolworth, Niagara Falls, N. Y.

**Handles.**

New Process Raw Hide Co., Syracuse, N. Y.  
New York Mallet and Handle Wks., 456 E. Houston St., N. Y.

**Hangers, Door.**

Lane Bros., Poughkeepsie, N. Y.  
Victor Mfg. Co., Newburyport, Mass.

**Hardware Comm'n Merchants.**

Doscher, Martin, 88 Chambers, N. Y.  
Field, Alfred & Co., 93 Chambers St., N. Y.  
Graham, John H. & Co., 111 Chambers St., New York  
Jacobus, W. H., 90 Chambers, N. Y.

**Hardware Manufacturers.**

Hutchins, E. S., Bridgeport, Conn.  
Stearns, E. C. & Co., Syracuse, N. Y.  
Union Mfg. Co., 103 Chambers, N. Y.  
Yale & Towne Mfg. Co., Stamford, Conn.

**Hardware Mfrs. Agents.**

Bingham, W. Co., Cleveland, O.  
Graham, John H. & Co., 113 Chambers, N. Y.  
Hassay, R. J. & Co., 80 John St., N. Y.  
McCoy, Jos. F. Co., 26 Warren St., N. Y.  
Sickles, Sweet & Lyon, 35 Barclay, N. Y.  
Underhill, Clinch & Co., 94 Chambers St., N. Y.

**Hardware Specialties.**

Aome Shear Co., Bridgeport, Conn.  
Beiden Machine Co., New Haven, Conn.  
Empire Portable Forge Co., Lansing, Mich.  
Enterprise Mfg. Co., Philadelphia, Pa.  
Ette & Henger Mfg. Co., St. Louis, Mo.  
Haines & Zimmerman, Phila., Pa.  
Hart, G. Mfg. Co., Detroit, Mich.  
Henn, A. S. & Co., New Haven, Conn.  
Johnson, S. C., Racine, Wis.  
Knapp & Cowles Mfg. Co., Bridgeport, Conn.  
New Britain Hdw. Mfg. Co., New Britain, Conn.  
North Bros. Mfg. Co., Philadelphia, Pa.  
Peabody & Parks, Troy, N. Y.  
Shepard, Sidney & Co., Buffalo, N. Y.  
Welland, Chas., 113 Chambers St., N. Y.  
Wilson, J. Fred, Worcester, Mass.  
Wire Goods Co., Worcester, Mass.  
Underhill, Clinch & Co., 94 Chambers Street, N. Y.

**Hardware, Yacht and Ship.**

Ferdinand, L. W. & Co., Boston, Mass.

**Harness Snaps.**

Covert Mfg. Co., West Troy, N. Y.  
Coverts' Saddlery Wks., Farmer, N. Y.  
Fitch, W. & E. T., New Haven, Conn.

**Hav Knives.**

Holt, Hiram Co., E. Wilton, Me.

**Holting Machines.**

Box, Alfred & Co., 314 Green, Phila.  
Jrowe Holting & Conveying Mch. Co., Ohio  
Coneland & Bacon, 85 Liberty St., N. Y.  
Fulton Iron & Engine Wks., Detroit, Mich.  
Harrington, E., Son & Co., Phila.  
Lane Bros., Poughkeepsie, N. Y.  
Lidgerwood Mfg. Co., 96 Liberty, N. Y.  
Maris & Beekley, Philadelphia.  
Moore Mfg. & Fdy. Co., Milwaukee, Wis.  
Morse, Williams & Co., Phila.  
Sellers, Wm. & Co., Phila. and N. Y.  
Spindel, J. G., Reading, Pa.  
Yale & Towne Mfg. Co., Stamford, Ct.

**Hollow-Ware.**

Bronson Supply Co., Cleveland, Ohio.  
Cleveland Stamping & Tool Co., Cleveland, O.  
Stuart & Peterson Co., Phila., Pa.

**Hollowware, Aluminum.**

Illinois Pure Aluminum Co., Lemont, Ill.

**Horse and Barbers' Clippers.**

Hutchins, E. S., Bridgeport, Conn.

**Horse Nails, Makers of.**

National Horse Nail Co., Vergennes, Vt.

**Horse Shoes, Makers of.**

Bryden Horse Shoe Co., Catsauqua, Pa.  
Burden Iron Co., Troy, N. Y.  
Crescent Horse Shoe & Iron Co., Max Meadows, Va.  
Diamond State Iron Co., Wilmington, Del.  
Old Dominion Iron & Nail Works Co., Richmond, Va.  
Phoenix Horse Shoe Co., Poughkeepsie, N. Y.  
Rhode Island Perkins Horse Shoe Co., Providence.  
Standard Horse Shoe Co., Boston, Mass.

**Hose.**

Cleveland Rubber Co., Cleveland, O.  
N. Y. Belting & Packing Co., Ltd., 15 Park Row, N. Y.

**Hotels.**

The Audubon, Chicago, Ill.

**Hydrants, &c.**

McLean, John, 298 & 298 Monroe, N. Y.

**Hydraulic Jacks.**

Dudgeon, Richard, 24 Columbia, N. Y.  
Watson & Stillman, 204 E. 43d, N. Y.

**Ice-Cream Freezers.**

North Bros. Mfg. Co., Phila., Pa.  
Packer, C. W., Philadelphia, Pa.  
White Mountain Freezer Co., Nashua, N. H.

**Ice Shavers.**

Enterprise Mfg. Co., Philadelphia, Pa.

**Ice Tongs.**

Stoppard, Robt, Auburn, N. Y.

**Injectors.**

Jenkins Bros., New York

**Insurance, Boiler.**

Hartford Steam Boiler Inspection & Insurance Co., Hartford, Conn.

**Iron and Steel, Swedish.**

Lundberg, Gustaf, Boston, Mass.  
Milne, A. & Co., 1 Broadway, N. Y.

**Iron Commission Brokers.**

Corning, Edw. & Co., 29 B'way, N. Y.  
Cotton, Bradley & Co., Philadelphia.  
Etting, Edw. J., Philadelphia.  
Hogan, John L. & Co., Philadelphia, Pa.  
Hoffman, J. W. & Co., Philadelphia.  
Levis, Henry & Co., Philadelphia.  
Keeley, Jerome & Co., Philadelphia.  
Lea, J. Tammill & Co., Philadelphia.  
Mohr, J. J., 430 Walnut, Philadelphia.  
Mann, E. S. & Co., Philadelphia.  
Pilling & Orms, Philadelphia, Pa.  
Sibell, Geo. H. & Co., Chicago, Ill.  
Wister, L. & R. & Co., Phila., Pa.

**Iron Ore.**

Naylor Co., 45 Wall, N. Y.  
Pickards, Brown & Co., Chicago, Ill.  
Pullman, J. Wesley, Phila., Pa.  
Samuel, Frank, Philadelphia, Pa.

**Iron, Merchants.**

Barnes, C. E. & Co., Philadelphia, Pa.  
Borden & Lovell, West, N. Y.  
Bussenius & Cunliffe, Philadelphia.  
Corning Edw. & Co., 29 B'way, N. Y.  
Cox, Justice, Jr., Philadelphia.  
Cotton, Bradley & Co., Philadelphia.  
Hoffman, J. W. & Co., Philadelphia.  
Leonard, J., 440 West St., N. Y.  
Naylor & Co., 45 Wall St., N. Y.  
Nicolls, Wheeler & Co., Philadelphia.  
Ogden & Wallace, 85 Elm St., N. Y.  
Pickards, Brown & Co., Chicago, Ill.  
Pierson & Co., 29 Broadway, N. Y.  
Richards, D. W. & Co., 88 Mangin St., N. Y.  
Thomson, W. H. & Co., Phila., Pa.  
Wallace, Wm. H. & Co., Albany & Washington streets, N. Y.  
Whitney, A. R. & Co., 17 B'way, N. Y.  
Wilson, S. H. & Co., Philadelphia.

**Iron, Importers.**

Abbott, Jere & Co., N. Y. and Boston.  
Lundberg, Gustaf, Boston, Mass.

**Iron, Sheet. Manufacturers of.**

Cambridge Iron & Steel Co., Cambridge, Ohio.  
W. Dewees Wood Co., Lim., McKeesport, Pa.

**Ironwork, Ornamental.**

Barnum, E. T., Detroit, Mich.  
Champion Iron Co., Kenton, O.  
Ludlow-Saylor Wire Co., St. Louis, Mo.  
Meat, Foss & Co., Springfield, O.  
The Van Dorn Iron Works Co., Cleveland, O.

**Keys.**

Wellensak, J. F., Chicago, Ill.

**Ladders.**

Davies, Chas. & Co., Williamsport, Pa.

**Ladles.**

Detroit Fdy. Equipment Co., Detroit, Mich.

**Lamp Stoves.**

Glazier Stove Co., Chelsea, Mich.

**Lanterns.**

Dietz, R. E. Co., 60 Leight St., N. Y.  
Ohio Lantern Co., Tiffin, Ohio.  
Steam Gauge & Lantern Co., Syracuse, N. Y.

**Lathes.**

Draper Machine Tool Co., Worcester, Mass.  
Johnson, Israel H., Jr., & Co., Philadelphia.  
Seneca Falls Mfg. Co., Seneca Falls, N. Y.

**Lathing, Wire.**

Clinton Wire Cloth Co., Clinton, Mass.  
N. J. Wire Cloth Co., Trenton, N. J.  
Wright & Colton Wire Cloth Co., Worcester, Mass.

**Laundry Machines.**

Johnson, S. C., Racine, Wis.

**Lawn Mowers.**

Chadborn & Coldwell Mfg. Co., Newburgh, N. Y.  
Coldwell Lawn Mower Co., Newburgh, N. Y.  
F. & N. Mfg. Co., Richmond, Ind.  
Henley, M. C., Richmond, Ind.  
Lape, W. E., Syracuse, N. Y.  
Meat, Foss & Co., Springfield, O.  
Stearns, E. C. & Co., Syracuse, N. Y.  
Supplee Hdw. Co., Phila., Pa.

**Lawn Rakes.**

Schaeffer & Co., Dayton, Ohio.  
Syracuse Specialty Mfg. Co., Syracuse, N. Y.

**Lawn Sprinklers.**

Ette & Henger Mfg. Co., St. Louis.  
McGowan, John H. Co., Cincinnati, O.

**Lawn Sweepers.**

Lape, W. E., Syracuse, N. Y.

**Lawn Swings.**

Davies, Chas. & Co., Williamsport, Pa.

**Lemon Squeezers.**

Ripley Mfg. Co., Unionville, Conn.

**Letters, Paper.**

Tablet & Ticket Co., Chicago, Ill.



**Machinery.**

**Am. Tool Works, Cleveland, Ohio.**  
 Barnes, W. F. & John, Rockford, Ill.  
 Becker, Wm. Mfg. Co., Fitchburg, Mass.  
 Bement, Miles & Co., Philadelphia, Pa.  
 Bigelow, C. E., 45 Dey, N.Y.  
 Bissell & Keeler Mfg. Co., St. Louis.  
 Birmingham Iron Foundry, Birmingham, Conn.  
 Bliss, E. W. Co., Brooklyn, N. Y.  
 Bogert, Jno. L., Fitchburg, N. Y.  
 Briggs, Marvin, 12 Broadway, N. Y.  
 Carlin's Sons, Thos., Allegheny, Pa.  
 Cinn. Milling Mch. Co., Cincinnati, Ohio.  
 Clapp, Geo. M., agt., 74 Cortlandt, N.Y.  
 Coulter & McKensie Mch. Co., Bridgeport, Conn.  
 Crutcher, D. B., Providence, R. I.  
 Detrick & Harvey Mch. Co., Baltimore, Md.  
 Ehrhardt, Gustave & Sons, Pittsburgh, Pa.  
 Fitchburg Mch. Works, Fitchburg, Mass.  
 Garvin Mch. Co., Light & Canal Sts.  
 Gould & Eberhardt, Newark, N. Y.  
 Hamilton Mch. Tool Co., Hamilton, O.  
 Harrington, E. Son & Co., Phila. Pa.  
 Hendey Machine Co., Torrington, Ct.  
 Hill, Clarke & Co., Boston, Mass.  
 Ingersoll Milling Machine Co., Rockford, Ill.  
 Johnson, Israel H., Jr., & Co., Phila.  
 Jones & Lamson Mch. Co., Springfield, Vt.  
 Kelly, Daniel, Phila., Pa.  
 Lodge & Shipley Mch. Tool Works, Cincinnati, O.  
 Lovegrove & Co., Philadelphia, Pa.  
 McCabe, J. J., 68 Cortlandt, N. Y.  
 Machinists Supply Co., Rochester, N. Y.  
 Manville, E. J. Mch. Co., Waterbury, Conn.  
 Morton Mfg. Co., Muskegon Heights, Mich.  
 Newark Mch. Tool Works, Newark, N. J.  
 New Haven Mfg. Co., New Haven, Conn.  
 New York Mach'y Depot, N. Y.  
 Niles Tool Wks., 138 Liberty St., N. Y.  
 Pedrick & Ayer, Philadelphia, Pa.  
 Pittsburgh Mfg. Co., Pittsburgh, Pa.  
 Place, Geo., 120 Broadway, N. Y.  
 Poole, Robt. & Son Co., Baltimore, Md.  
 Powell Planer Co., Worcester, Mass.  
 Pratt & Whitney Co., Hartford, Conn.  
 Serrant Tool & Supply Co., N. Y.  
 Serrant Supply & Mch'y. Co., Scranton, Pa.  
 Sellers, Wm. & Co., Phila.  
 Seyfert's Sons L. F., Philadelphia, Pa.  
 Steptoe, J. & Co., Cincinnati, O.  
 Stow Flexible Shaft Co., Ltd., Phila.  
 Toomey, Frank, Philadelphia, Pa.  
 Wetherill, Robert & Co., Chester, Pa.  
 Wilson, W. A., Rochester, N. Y.  
 Woodruff Mfg. Co., Hartford, Conn.

**Machinery for Hardware Manufacturers.**

Adt, Jno. & Son, New Haven, Conn.

**Machine Knives.**

Loring Coes & Co., Worcester, Mass.

**Machine Tools.—See Machinery.****Machine Work.**

Papping, J., 58th St., 11th Ave., N.Y. City.

**Machinists' Scales.**

Coffin & Leighton, Syracuse, N. Y.  
 Starrett, L. S., Athol, Mass.

**Machinists' Tools and Supplies.**

King, J. M. & Co., Waterford, N. Y.  
 Sellers, Wm. & Co., Inc., Phila.

**Mallets.**

N. Y. Mallet & Handle Works, N. Y.

**Mangles.**

Johnson, S. C., Racine, Wis.

**Measuring Tapes.**

Lufkin Rule Co., Saginaw, Mich.

**Meat Cutters.**

Enterprise Mfg. Co., Philadelphia, Pa.

**Metals.**

Fearing, Wm. S., 100 Chambers, N. Y.  
 Hendricks Bros., 49 Cliff, N. Y.  
 Naylor & Co., 45 Wall, N. Y.

**Metal Brokers.**

American Metal Co., N. Y.

**Metalurgists.**

Britton, J. Blodgett, Phila.

**Metal Saws.**

Ehrhardt, Gustave & Sons, Pittsburgh, Pa.  
 Q & C Co., Chicago, Ill.

**Milling Machines.**

Cin. Milling Mch. Co., Cincinnati, Ohio.  
 Ingersoll Milling Machine Co., Rockford, Ill.  
 Pedrick & Ayer, Phila. Pa.

**Mining Knives.**

Palmer Edw. Mfg. Co., Troy, N. Y.

**Mine Lamps.**

Darby, Edw. & Sons, Phila. Pa.  
 Leonard, B. E., Scranton, Pa.  
 Leonard, T. F., Scranton, Pa.

**Mining Screens.**

Harrington & King Perforating Co., Chicago, Ill.  
 Hendrick Mfg. Co., Ltd., Carbondale, Pa.  
 Howard & Morse, 45 Fulton, N. Y.

**Mirrors.**

Rice, C. F., Chicago, Ill.

**Molding Sand.**

Chicago Foundry Supply Co., Chicago, Ill.  
 Obermayer, S. Co., Cincinnati, O.  
 Paxson, J. W. & Co., Phila.

**Motors, Water and Electric.**

C. & C. Electric Motor Co., 402 and 404 Greenwich St., N. Y.  
 Dallett, Thos. H. & Co., Phila., Pa.  
 Thomson, Houston Motor Co., Boston, Mass.

**Nail Machinery.**

Pittsburgh Mfg. Co., Pittsburgh, Pa.

**Nails (Cut) and Spikes.**

Borden & Lovell, 70 West, N. Y.  
 Cumberland Nail & Iron Co., Phila.  
 Oxford Iron Co., 81 Washington, N. Y.  
 Pottstown Iron Co., Pottstown, Pa.  
 Riverside Iron Wks., Wheeling, W. Va.

**Nickel Platers' Supplies.**

Zucker & Levett Chemical Company, 10 to 14 Grand St., N. Y.

**Norway Shapes, Rollers of.**

Rowland, William & Harvey, Frankford, Philadelphia

**Nut Machines.**

Dunham Nut Mch. Co., Unionville, Ct.

**Nuts, Bolts, &c., Makers of.**

American Bolt Co., Lowell, Mass.  
 American Screw Co., Providence, R. I.  
 Blake & Johnson, Waterbury, Conn.  
 Haskell, Wm. H. Co., Pawtucket, R. I.  
 Mt. Carmel Bolt Co., Mt. Carmel, Conn.  
 Fort Chester Bolt and Nut Co., Pawtucket, N. Y.  
 Russell, Burdick & Ward, Port Chester, N. Y.  
 Sternberg, J. H. & Son, Reading, Pa.  
 Wilson, J. Fred, Worcester, Mass.  
 Wm. H. Haskell Co., Pawtucket, R. I.

**Oil Stones.**

Pike Mfg. Co., Pike Station, N. H.

**Oil Stoves.**

Glazier Stove Co., Chelsea, Mich.

**Ores.**

Wister, Francis, Philadelphia, Pa.

**Dr. Shees.**

Scranton Forging Co., Scranton, Pa.

**Packings.**

Billington, Jas. H. & Co., Phila., Pa.  
 Morrison, Robt., St. Louis, Mo.  
 N. Y. Belting & Packing Co. Ltd., N. Y.

**Padlocks.**

Ames Sword Co., Chicopee, Mass.  
 Train, E. T., Lancaster, Pa.  
 Hillebrand & Wolf, Phila., Pa.  
 Miller Lock Co., Philadelphia, Pa.

**Paint.**

Detroit Graphite Mfg. Co., Detroit, Mich.  
 Dixon, Jos. Crucible Co., Jersey City, N. J.

**Paint Burners.**

Dangler Stove & Mfg. Co., Cleveland, O.

**Patent Solicitors.**

Fitzgerald, S. C., Washington, D. C.  
 Howson & Howson, Phila. & Washgton.  
 Jenner, H. W. T., Washington, D. C.  
 Stocking, E. B., Washington, D. C.

**Perforated Metal.**

Clinton Wire Cloth Co., Clinton, Mass.  
 Harrington & King Perforating Co., Chicago, Ill.  
 Hendrick Mfg. Co., Ltd., Carbondale, Pa.

**Phosphor Bronze.**

Phosphor Bronze Smelting Co., Limited, 512 Arch, Philadelphia.

**Phosphor Tin.**

Crescent Phosphorized Metal Co., Philadelphia, Pa.  
 Crosby Steam Gauge & Valve Co., Boston, Mass.  
 Balk & Naumann, 516 Pearl, N. Y.

**Picks and Mattocks.**

Plumb, Fayette K., Philadelphia, Pa.

**Pig Iron.**

Houston, C. B. & Co., Philadelphia, Pa.  
 Mann, Edwin R., Philadelphia, Pa.  
 Montour Iron & Steel Co., Danville, Pa.  
 Naylor & Co., 45 Wall, N. Y.  
 Pickands, Brown & Co., Chicago, Ill.  
 Pilling & Crane, Philadelphia, Pa.  
 Samuel, Frank, Philadelphia, Pa.

**Pig Iron Storage.**

Am. Pig Iron Storage Warehouse Co., 44 Wall, N. Y.

**Pile Drivers.**

Vulcan Iron Wks., Chicago, Ill.

**Pipe, Bent.**

National Pipe Bending Co., New Haven

**Pipe Cutting and Threading Machines.**

Signal & Keeler Mfg. Co., St. Louis, Mo.  
 Merrill Mfg. Co., Toledo, O.  
 Paconast, Henry B. & Co., Philadelphia, Pa.  
 Saunders' Sons, D., Yonkers, N. Y.

**Pipe Grips.**

Prentiss Vise Co., 44 Barclay, N. Y.

**Pipes, Fittings, &c., Makers of.**

McNab & Harlin Mfg. Co., N. Y.

**Pipe, Water and Gas, Makers of.**

Cumberland Nail & Iron Co., Phila. Pa.  
 Donaldson Iron Co., Emmaus, Pa.  
 Riverside Iron Works, Wheeling, W. Va.  
 Wood, R. D. & Co., Philadelphia, Pa.

**Plane Irons, Manufacturers of.**

Suck Bros., Millbury, Mass.

**Planes, Manufacturers of.**

Stanley Rule & Level Co., N. Y.

**Plate, Iron and Steel, Mfgs of.**

Aetna-Standard Iron & Steel Co., Bridgeport, O.  
 Atkins Iron & Steel Co., Coatesville, Pa.  
 Mahoning Valley Iron Co., Youngstown, Ohio.  
 Goodhead-McLean Co., Pittsburgh, Pa.  
 McIlvain & Sons, Reading, Pa.  
 Pottstown Iron Co., Pottstown, Pa.  
 Pottsville Iron & Steel Co., Pottsville, Pa.

**Pliers, Nippers &c., Makers of.**

Singer, Nimblek & Co., Pittsburgh, Pa.  
 Mahoning Valley Iron Co., Youngstown, O.  
 Wellman Iron & Steel Co., Thurlow, Pa.  
 Wood Alan Co., Philadelphia.

**Plating, Nickel, Brass and Silver.**

Wilmot & Hobbs Mfg. Co., Bridgeport, Conn.

**Plumbago.**

Chicago Fdy. Supply Co., Chicago, Ill.

**Pokers and Lifters.**

Troy Nickel Works, Troy, N. Y.

**Polishing Machines.**

Watson & Stillman, 204 E. 48d, N. Y.

**Polishing Wheel.**

La Massena, C. E. & Co., Newark, N. J.

**Post Hole Diggers.**

Kohler, F. E. & Co., Canton, O.  
 Wistler, L. E. & Co., Philadelphia, Pa.

**Poultry Nettings.**

Barnum, E. T., Detroit, Mich.  
 Gilbert & Bennett Mfg. Co., 42 Cliff St., N. Y.  
 N. J. Wire Cloth Co., Trenton, N. J.  
 N. J. Silver Finishing Co., N. Y.  
 Tyler Wire Wks. Co., W. S., Cleveland, O.  
 Wright & Colton Wire Cloth Co., Worcester, Mass.

**Powder.**

Ladin & Rand Powder Co., 29 Murray New York Powder Co., 62 Liberty St., N. Y.

**Power Hack Saws.**

Millers Falls Co., 93 Reade St., N. Y.

**Power Hammers.**

Belden Mach. Co., New Haven, Conn.  
 Diemel & Eisenhardt, Philadelphia.  
 Dupont Mfg. Co., St. Johnsbury, Vt.  
 Jenkins & Lingie, Bellefonte, Pa.  
 Long & Allstatter Co., Hamilton, Ohio.

**Presses, Dies, &c.**

E. W. Bliss Co., Brooklyn, N. Y.  
 Crosby, G. A. & Co., Chicago, Ill.  
 Niagara Stamping & Tool Co., Buffalo, N. Y.  
 Stark Mch. & Tool Co., Buffalo, N. Y.  
 Stiles & Parker Press Co., Brooklyn, N. Y.  
 Waterbury Mch. Co., Waterbury, Conn.

**Presses, Power, Makers of.**

Bliss, E. W. Co., Brooklyn, N. Y.  
 Manville, E. J. Mch. Co., Waterbury, Ct.  
 Merriman, A. H., Meriden.  
 Niagara Stamping and Tool Co., Buffalo, N. Y.  
 Stark Mch. & Tool Co., Buffalo, N. Y.  
 Waterbury Farrel Foundry and Machine Co., Waterbury, Conn.

**Pulleys.**

Keystone Clutch, Mch. Wks., Phila., Pa.

**Pulverizing Mill.**

Bradley Fertilizer Co., Boston, Mass.

**Pumping Machinery.**

Coulter & McKenzie Mch. Co., Bridgeport, Conn.  
 Ward Bros. Steam Pump Works, Indianapolis, Ind.  
 Hooker-Corliss Steam Pump Co., Chicago, Ill.  
 McGowan, J. H. & Co., Cincinnati, O.  
 Maslin, J. & Son, Jersey City, N. J.  
 Newark Iron Wks. Co., So. Norwalk, Conn.  
 Southwark Fdy. & Mch. Co., Phila. Pa.  
 Valley Pump Wks., Easthampton, Mass.  
 Worthington, Henry R., 86 & 88 Liberty St., N. Y.

**Pumps, Makers of.**

Bellevue Pump Co., Bellevue, Iowa.  
 Deming Co., Salem, O.  
 Douglas, W. B., Middletown, Conn.  
 Mast, Foss & Co., Springfield, O.  
 Myers, F. E. & Bro., Ashland, O.

**Punches and Shears, Hand and Power.**

E. W. Bliss Co., Brooklyn, N. Y.  
 Cockburn Barrow & Mch. Co., Jersey City, N. J.  
 Crosby, G. A. & Co., Chicago, Ill.  
 Long & Allstatter Co., Hamilton, Ohio.  
 Niagara Stamping and Tool Co., Buffalo, N. Y.  
 Stark Mch. & Tool Co., Buffalo, N. Y.  
 Stiles & Parker Press Co., Brooklyn, N. Y.  
 Vais & Roos, Punch & Shear Co., Cincinnati, Ohio.  
 Waterbury Farrel Foundry and Mch. Co., Waterbury, Conn.  
 Watson & Stillman, 204 E. 48d, N. Y.

**Rails, Old and New.**

Perry, W. H. & Co., Providence, R. I.  
 Schwarzenberg Bros. & Co., Cleveland O.

**Rat and Mouse Traps.**

Burditt & Williams, Boston, Mass.  
 Estey, W. S., 65 Fulton, N. Y.  
 Ripley Mfg. Co., Unionville, Conn.

**Razors.**

Butcher, W. & S., 135 Duane St., N. Y.  
 Crosby, G. A. & Co., Warren St., N. Y.  
 Electric Cutlery Co., 113 Chambers, N. Y.  
 Schmitz, E. Lothar, 92 Reade St., N. Y.  
 J. R. Torrey Razor Co., Worcester, Mass.

**Refrigerator Door Fasteners.**

Conroy, P. J. & Co., Philadelphia.

**Rivets.**

Blake & Johnson, Waterbury, Conn.  
 Eardley Iron Co., Troy, N. Y.  
 Cobb & Drew, Plymouth, Mass.  
 Henderson, Jas. S., 166 Greenwich, N. Y.  
 Plymouth Mills, Plymouth, Mass.  
 Sternberg, J. H. & Son, Reading, Pa.  
 Townsend, W. P. & Co., New Brighton, Pa.

**Riveting Machines.**

Adt, Jno. & Sons, New Haven, Conn.

**Roadsters and Bakers.**

Matthai, Ingram & Co., Baltimore, Md.

**Rock Drills.**

Penna. Diamond Drill & Mfg. Co., Birdsboro, Pa.  
 Rand Drill Co., 23 Park Place, N. Y.

**Rolling Mill Machinery**

Birmingham Iron Fdry, Birmingham, Conn.  
 Booth, The Lloyd Co., Youngstown, O.  
 Leechburg Foundry & Mch. Co., Pittsburgh, Pa.  
 Mahoning Fdry & Mch. Co., Danville, Pa.  
 Morgan Construction Co., Worcester, Mass.  
 Robinson-Rea Mfg. Co., Pittsburgh.  
 Totten & Hogg Iron and Steel Fdry Co., Pittsburgh, Pa.  
 Trethewey Mfg. Co., Pittsburgh, Pa.  
 Waterbury Farrel Foundry & Mch. Co., Waterbury, Conn.

**Roll Lathes.**

Totten & Hogg Iron and Steel Fdry Co., Pittsburgh, Pa.

**Rolls, Chilled, Sand and Steel.**

Booth, The Lloyd Co., Youngstown, O.  
 Garrison, A. Fdry. Co., Pittsburgh, Pa.  
 Johnson Foundry Co., Johnstown, Pa.  
 Seaman, Slesch & Elia, Pittsburgh.  
 Totten & Hogg Iron and Steel Fdry Co., Pittsburgh, Pa.

**Roofing.**

Berlin Iron Bridge Co., E. Berlin, Conn.  
 Boston Bridge Works, Boston, Mass.  
 Cambridge Roofing Co., Cambridge, O.  
 Johns, H. W. Mfg. Co., 87 Malden Lane

**Rope and Web Goods.**

Covert Mfg. Co., West Troy, N. Y.  
 Covert's Saddlery Wks., Farmer, N. Y.

**Rope Wheels.**

Cresson, Geo. V. Co., Philadelphia, Pa.

**Rubber Goods.**

Candfield, H. O., Bridgeport, Conn.

**Rules, Manufacturers of.**

Lufkin Rule Co., Saginaw, Mich.  
 Standard Tool Co., Athol, Mass.  
 Stanley Rule & Level Co., 29 Chambers, N. Y.

**Sad Irons.**

Universal Sad Iron Co., Milwaukee, Wis.

**Sand Paper.**

Baeder, Adamson & Co., Phila., Pa.

**Sash Balances.**

Caldwell Mfg. Co., Rochester, N. Y.  
 Fullman Sash Balance Co., Rochester, N. Y.  
 Stewart & Baker, Rochester, N. Y.  
 Vanderbilt Sash Balance Co., Canandaigua, N. Y.

**Sash Cords and Chains.**

Morton, Thos., 65 Elizabeth, N. Y.  
 Ossawan Mills Co., Norwich, Conn.  
 Samson Cordage Works, Boston, Mass.  
 Smith & Egge, Mfg. Co., Bridgeport, Conn.  
 Cincinnati Corrugating Co., Piqua, O.

**Sash Locks.**

Ives, H. E. & Co., New Haven, Conn.

**Sash Pulleys.**

Empire Portable Forge Co., Lansingburgh, N. Y.

Palmer Hardware Mfg. Co., Troy, N. Y.

**Sash Pulley Marker.**

Skelly, J. W. & Son, Bristol, Conn.

**Sash Weights.**

Brown, E. E. & Co., Philadelphia, Pa.

Skelly, J. W. & Son, Bristol, Conn.

**Saws, Makers of.**

Disston, Henry & Sons, Phila., Pa.  
 Hiles, C. A. & Co., 336-338 Carroll Ave, Chicago, Ill.

National Saw Co., 96 Reade St., N. Y.  
 Simonds Mfg. Co., Fitchburg, Mass.

**Saw Sets.**

Kahler, F. E. & Co., Canton, Ohio.  
 Taintor Mfg. Co., 84-86 Chambers, N. Y.

**Scales, Manufacturers of.**

Buffalo Scale Co., Buffalo, N. Y.  
 Chatillon, John & Sons, 85-8

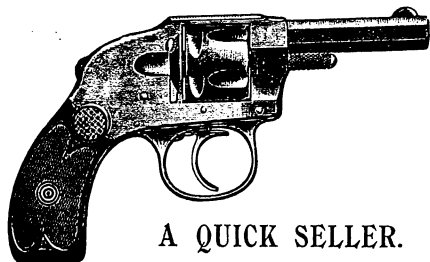
- Allentown Rolling Mill.** Allentown, Pa.  
**Illinois Steel Co.,** Chicago, Ill.  
**Lockhart Iron & Steel Co.,** Pittsburg, Pa.  
**Passaic Rolling Mill Co.,** Paterson, N.J.  
**Pottsville Iron & Steel Co.,** Pottsville, Pa.  
**Roberts, A. & P. & Co.,** Phila., Pa.  
**The Phoenix Iron Co.,** Phila., Pa.  
**Tudor Iron Works, St. Louis, Mo.**
- Shearn and McIsers.**  
**Acme Shear Co.,** Bridgeport, Conn.  
**Reinischs, R. Sons Co.,** Newark, N. J.
- Sheet Iron and Steel, Manufacturers of.**  
**Etta Standard Iron and Steel Co.,** Bridgeport, O.  
**Cambridge Iron & Steel Co.,** Cambridge, Ohio.  
**Chess Bros.,** Pittsburgh, Pa.  
**Mahoning Valley Iron Co.,** Livingston, Ohio.  
**Moorhead-McCleane Co.,** Pittsburgh, Pa.  
**Pierson & Co.,** 29 Broadway, N. Y.  
**Reilly, John W.,** Fort Hunter P. O., Pa.  
**Singer, Nimick & Co., Ltd.,** Pittsburgh, Pa.  
**The Mahoning Valley Iron Co.,** Youngstown, O.  
**Alan Wood Co.,** Philadelphia.  
**W. Dewees Wood Co.,** McKeesport, Pa.
- Sheet Metal Work.**  
**Clark & Cowies,** Plainville, Conn.
- Sheet Zinc.**  
**Matthiessen & Hegeler Zinc Co.,** La Salle, Ill.
- Shelf Brackets.**  
**Koch, A. B. & Co.,** Peoria, Ill.
- Shovels, Spades and Scoops.**  
**Myers, H. M. Co.,** Beaver Falls, Pa.
- Sinks.**  
**Douglas, W. & B.,** Middletown, Conn.
- Skates, Ice.**  
**Dame, Stoddard & Kendall,** Boston, Mass.  
**Winslow, Sam'l, Skate Mfg. Co.,** Worcester, Mass.
- Skates, Roller.**  
**Henley, M. C.,** Richmond, Ind.  
**Winslow, Sam'l, Skate Mfg. Co.,** Worcester, Mass.
- Smelting Works.**  
**Reeves, Paul S.,** 760 S. Broad, Phila.
- Speaking Tubes.**  
**Ostrander, W. R. & Co.,** 204 Fulton St., N. Y.  
**Wollensak, J. F.,** Chicago, Ill.
- Specialties, Pat. Articles.**  
**Konigslow, O.,** Cleveland, O.
- Speed Indicators.**  
**Church & Slight,** 109 Fulton St., N. Y.
- Spelter.**  
**Matthiessen & Hegeler Zinc Co.,** La Salle, Ill.
- Spoons and Forks.**  
**Holmes & Edwards Silver Co.,** Bridgeport, Conn.  
**Rogers, The Wm. Mfg. Co.,** Hartford, Conn.
- Sporting Goods.**  
**Hartley & Graham,** 313-315 E'way, N.Y.
- Spring.**  
**American Spiral Spring Co.,** Pittsburgh, Pa.  
**Dunbar Bros.,** Bristol, Conn.  
**Miller & Van Winkle,** Brooklyn, N. Y.  
**Morgan Spring Co.,** Worcester, Mass.  
**Nourse, Fred. Co.,** 315 to 319 E. 22d St., N. Y.  
**Sabin Machine Co.,** Montpelier, Vt.  
**Tuck Mfg. Co.,** Brockton, Mass.  
**Washburn & Moen Mfg. Co.,** Worcester, Mass.  
**Wolff, R. H. & Co., Ltd.,** 118th St. and Harlem River, N. Y.
- Spring Hinges.**  
**Bardsley, J.,** 149 & 151 Baxter St., N. Y.  
**Pullman Sash Balance Co.,** Rochester, N. Y.  
**Stover Mfg. Co.,** Freeport, Ill.  
**Van Wagoner & Williams Co.,** 14 Warren St., N. Y.
- Spring Keys and Cutters.**  
**Whitman & Barnes Mfg. Co.,** Syracuse, N. Y.
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**Dienelt & Eisenhardt,** Philadelphia.  
**Dudgeon, Richard,** 24 Columbia Street, N. Y.  
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**Cambria Iron Co.,** Johnstown, Pa.  
**Illinois Steel Co.,** Chicago, Ill.  
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**La Belle Steel Co.,** Pittsburgh, Pa.
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**Bicycle Step Ladder Co.,** Chicago, Ill.  
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**Am. Brass & Copper Co.,** 19 and 21 Chiff, N. Y.  
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**Morse Twist Drill & Machine Co.,** New Bedford, Mass.  
**New Process Twist Drill Co.,** Taunton, Mass.  
**Standard Tool Co.,** Cleveland.
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**Kilbourne & Jacobs Mfg. Co.,** Columbus, Ohio.
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**Sidney Steel Scraper Co.,** Sidney, O.  
**Sweet Mfg. Co.,** Minneapolis, Minn.
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**Gautier Steel Department of Cambria Iron Co.,** Johnstown, Pa.  
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- Wire Cloth.**  
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**Wright & Colton Wire Cloth Co.,** Worcester, Mass.  
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**Phillips, Townsend & Co.,** Phila., Pa.  
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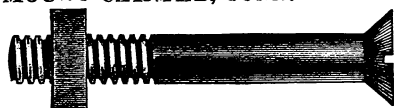
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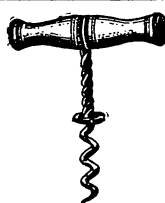
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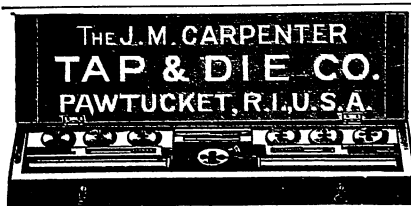
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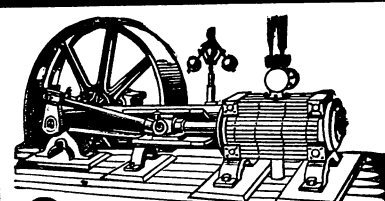
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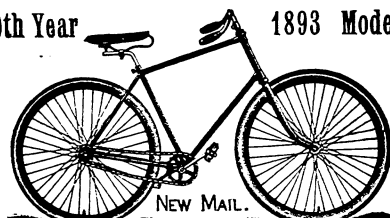
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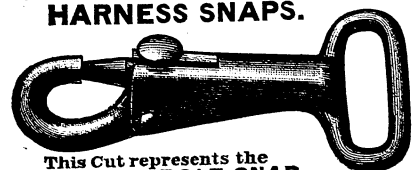
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WITH LEATHER  
LINING  
MADE OF  
MAPLE WOOD BODY  
HIGHLY POLISHED  
ONLY THE GENUINE ARE STAMPED  
IN THE WOOD  
WITH TRADE MARK  
MALTESE CROSS  
AS PER CUT  
BEWARE OF IMITATIONS  
FAUCETS SIMILAR  
IN SHAPE  
WITH KEY OF  
LEAD, IRON, OTHER METALS  
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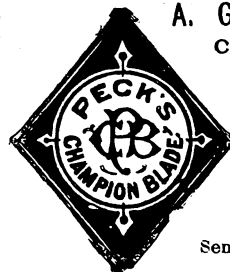


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# THE IRON AGE

THURSDAY, AUGUST 10, 1893.

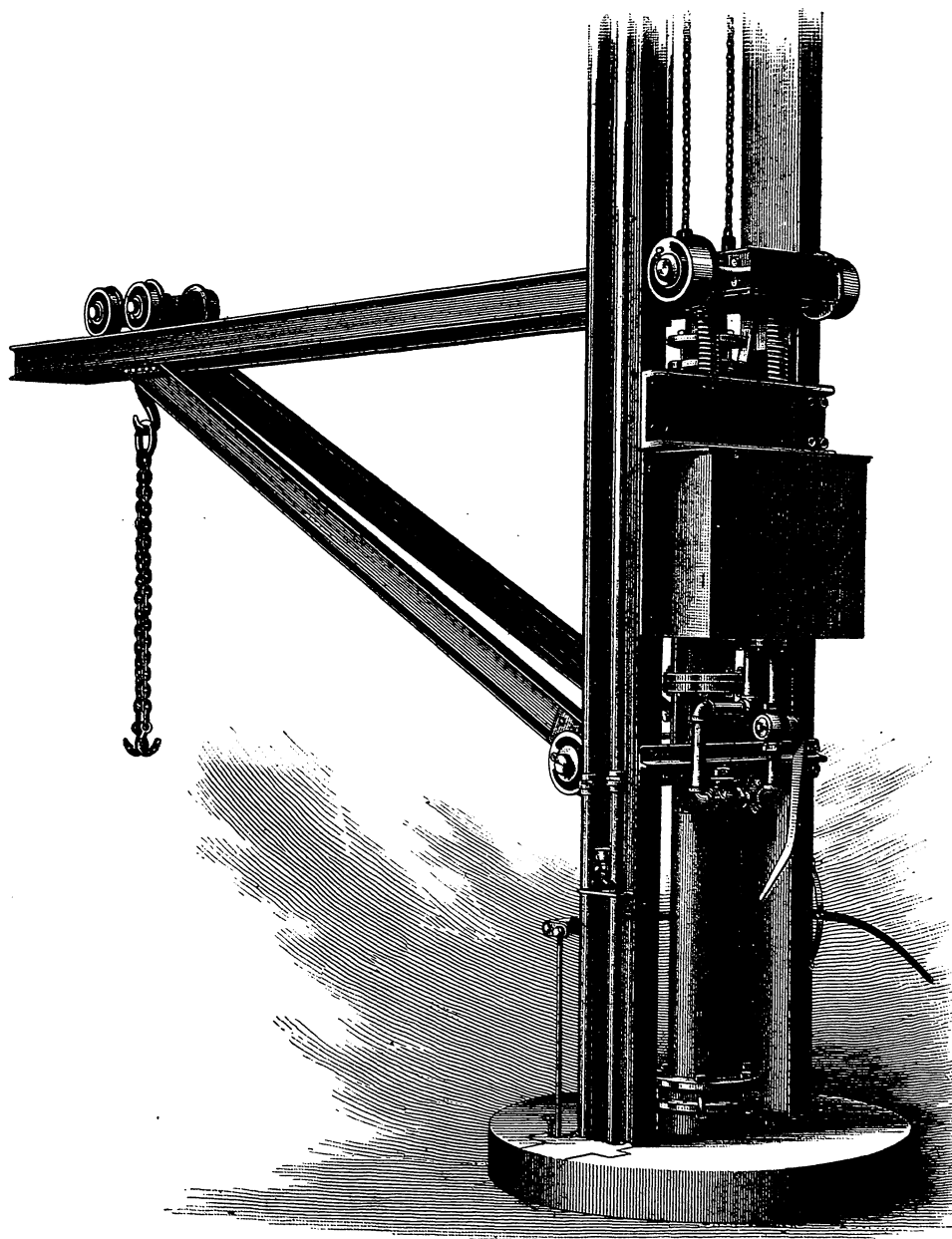
## The Halsey Hydraulic Jib Crane.

The disposition of American engineers to prove the strength of their designs rather than to find a weakness has resulted in a change of construction that produces massive machinery and heavy parts, and its building is confined

to the class above mentioned, and they above all others require a crane that is simple in construction, few in parts, positive in action, variable in speed, economical to operate and that can be handled by any laborer without risk. Up to the present time the hydraulic principle is the only one that can be made to accomplish these requirements

tends below the floor level and is stepped into a socket which is movable for adjustment, and rests on a base plate which is part of a cast-iron cylinder, Fig. 3, that is substituted for a foundation.

The base casting for the mast is made a steam cylinder, into which a trunk piston fits. The trunk of the piston



THE HALSEY HYDRAULIC JIB CRANE.

to those works having the necessary facilities for handling heavy work. This has been felt by many masters who have ingenuity enough to machine the parts with their light tools if they had the means for handling the work, and for the fact of their having limited means and working with a small capital they are unable to install a modern crane owing to expensive first cost and cost of operating and maintaining.

There is a great demand for overhead traveling cranes and swing cranes for machine shop and foundry use among

apart from first cost and economy in lifting variable loads.

The Halsey crane aims at accomplishing the requirements before mentioned, is economical in the use of power for lifting variable loads, only consuming sufficient power to overcome the friction and the load, and is inexpensive to install. Our engraving has been made from a photograph of a 4-ton ingot crane in operation at the Allentown Rolling Mills, Allentown, Pa.

The mast and arms are made of steel I-beams. The base of the mast ex-

forms a water cylinder and receives the lower portion of the hydraulic lifting cylinder as a plunger, which is held fast to the mast of the crane. In order to take the thrust of the water in the trunk of the steam piston, the water is forced through a port cast on one side of the hydraulic cylinder, and is regulated to enter the cylinder by a three-way valve, thus lifting the ram, which forces the arm and load upward, fast or slow, as may be desired.

By reversing the handle the discharge water from the hydraulic cylinder is

discharged through the admission valve and into the tank above. The water in the tank flows through a check valve that allows the trunk to be primed automatically, when it requires it, thereby using the water over and over. At one side of the mast steam and exhaust pipes connect the steam cylinder and

patterns, to a very fast speed. At the extremes of the lift spring buffers take the shock, should the operator neglect to stop the movement. In order to get the maximum of efficiency, the arm and ram are counterbalanced to the extent that the arm will descend to its normal position when unloaded. These cranes,

About two weeks ago the well, which showed up a small flow of oil, was drilled through, and the gas came with sufficient force to throw the tools out and up over the heads of the drillers. It is said the roar of the escaping gas could be heard eight miles from the derrick. The pressure increased daily,

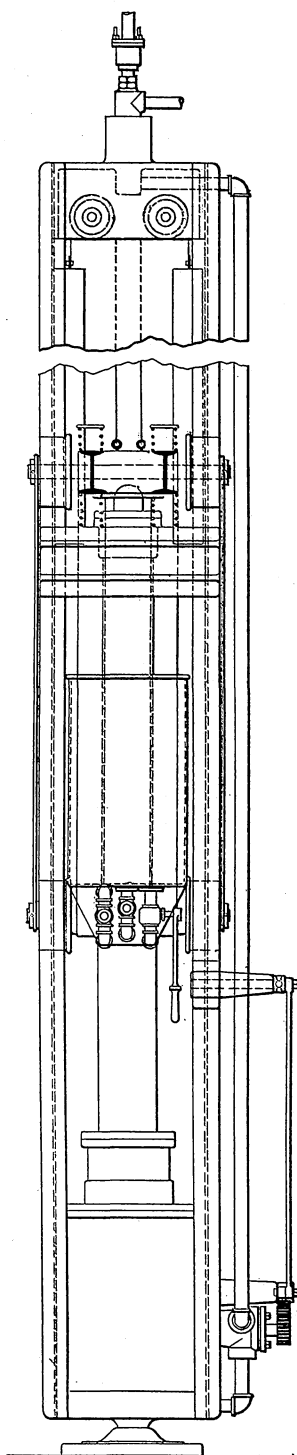


Fig. 2.—End Elevation.

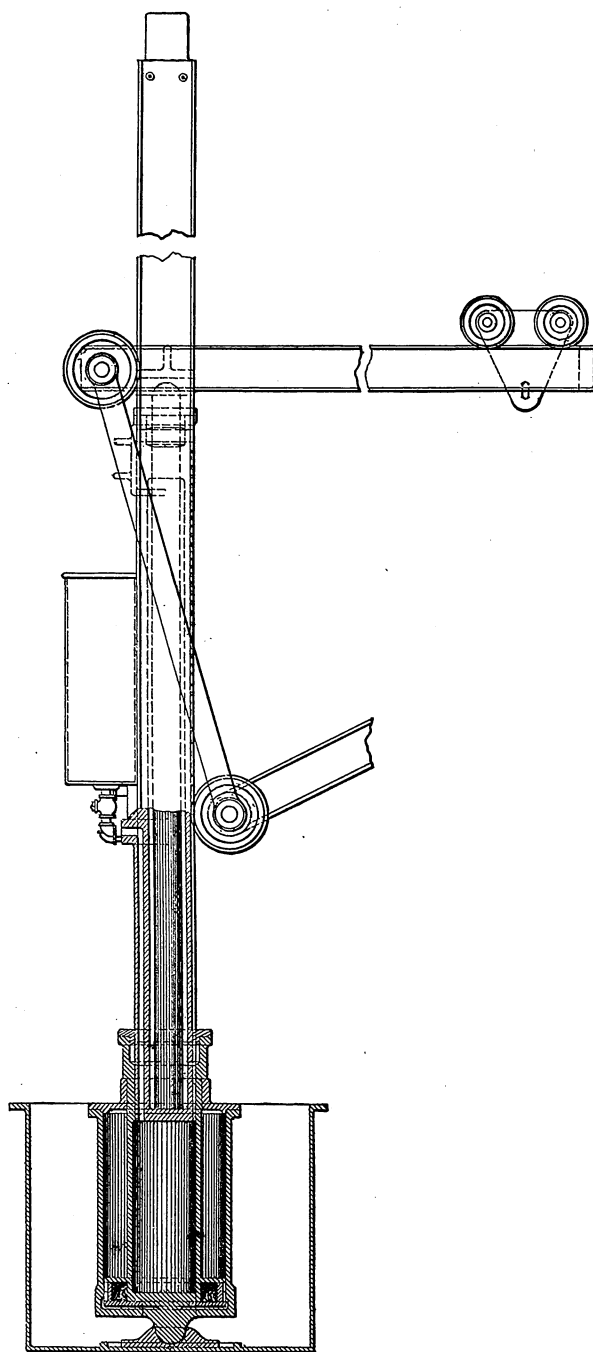


Fig. 3.—Side Elevation and Section.

#### THE HALSEY HYDRAULIC JIB CRANE.

the top trunnion through which the steam is passed; the steam coming from the boiler to the steam cylinder and is exhausted through the roof.

Two handles control the crane, one admitting and exhausting the steam, the other regulating the flow of water for lifting and lowering, thus giving any speed from a very slow and steady one, for lowering cores and drawing

designed and built by W. S. Halsey, are constructed with the stationary arm, with power racking and rotating of any desired capacity, as shown in our engravings.

The Monongahela Natural Gas Company have struck a big gas well on the Swagler farm, located in Somerset Township, Washington County, Pa.

and no fittings could be obtained to hold the gas, and it has been wasting for two weeks with an open pressure of 80 pounds. Very few wells struck in Western Pennsylvania have showed over 28 pounds open pressure. The well is owned by the Oliver Iron & Steel Company, the Republic Iron Works and the Oliver & Roberts Wire Company, all of Pittsburgh.

# The Engineers' Congress.

## MECHANICAL ENGINEERS.

The Wednesday morning session opened with a comparatively light attendance. Vice-President Charles W. Hunt occupied the chair. A letter was read from H. F. J. Porter of the World's Fair Committee, regretting that the unfavorable weather on Monday prevented a portion of the programme for that day being carried out. A new arrangement had been made with the World's Fair Steamship Company by which the whaleback "Christopher Columbus" was again tendered to carry the engineers to the World's Fair on Thursday afternoon, and a trip to the new water-works crib would also be at their disposal.

The first paper read was on "The Working of Centrifugal Machinery," by Gust. Herrmann, Professor of Technology, High School, Aix-la-Chapelle, Germany. In the absence of the author Secretary Hutton read the paper.

F. H. Ball of New York took issue with some of the statements made regarding rotating bodies, supporting his position by diagrams showing counter-balanced weights used in connection with reciprocating parts. Instead of the center of rotation being between the axis of revolution and the center of gravity it is at a point on the opposite side of the axis of revolution, as shown by experiments recorded by J. C. Hoadley, a pioneer of this society.

"The Removal of Dust in Workshops" was the subject of a paper by R. Kohfal, read by the secretary in the absence of the author. This paper was discussed by Alfred Vanderstegen of Ghent, Belgium, who described the method employed in a Belgian factory with very good results, illustrating the process by a diagram. J. T. Clarkson also described a dust collector in successful use in German works.

The paper of C. Pieper of Hamburg, Germany, on "The Taxameter, or Fare Indicator," was read by the secretary. There was no discussion.

"Improvements in the Art of Cable Making," by Emil Guilleaume, Muhlheim, Germany, was read by the secretary. It was followed by a paper on "Apparatus for Metering Steam," by Franz Seiler of Mannheim, Germany, also read by the secretary. "Measuring of Water and the Schinzel Water Meter," by F. Lux, was read by the secretary.

W. F. Durfee read a paper on "The Interchangeable System of Manufacture." Copies of this paper have not yet been supplied to the members, as it was completed too late to be printed. It is a very comprehensive historical document, starting out with the idea that interchangeability of parts is as ancient as the human race, which is illustrated by numerous quaint examples, ingeniously worked in to support this argument. Then follows a most valuable treatise on the development of machinery, in which the origin of various mechanical movements and devices is given, with authentic dates. The paper involved tremendous research on the part of the author, much of the information having been obtained by correspondence with authorities in foreign countries. It is a valuable contribution to the history of mechanical engineering.

On Wednesday afternoon, through the courtesy of Schaler & Schniglan, contractors, the engineers were taken by

steamboat up the south branch of the Chicago River to inspect the Canal street bridge recently completed by that firm. This is a folding bridge, locally known as "the jack-knife bridge," of peculiar construction to meet the requirements of the situation. The river here, although navigable for large vessels, is too narrow to permit the use of the ordinary swing bridge with its pier in the middle of the stream. The bridge just built was constructed on a design suggested by Capt. William Harmon, a Chicago sailor. The details were worked out and the structure erected by R. P. Lamont, engineer in the employ of Schaler & Schniglan. It consists of a movable roadway, which divides in the center over the middle of the river. Each half of the bridge is hinged at about one-third of its length from the shore. This permits the parts overhanging the river to drop down in front of the abutments, while the smaller hinged portions rise, forming a gate which intercepts the passage of teams or pedestrians, and in this way serves a useful purpose as a safety gate. The two halves of the bridge are supported when in position by heavy jointed eye-bars, depending from steel towers extending 50 feet above the roadway. The whole length of the bridge is 177 feet. The length of the movable portion is 100 feet. The actual span over the Chicago River is 80 feet. The width of the roadway is 21 feet and there is a 7-foot passage for pedestrians on each side. The whole structure is built of steel and weighs 130 tons. It is operated by a 10 horsepower engine on each side of the river. A system of counter weights is employed to facilitate the operation of raising and lowering. Each counter-weight weighs about 25,000 pounds. The machinery, except the engines, is all beneath the level of the bridge, presenting no obstruction whatever. It is operated very rapidly, having been opened or closed in 15 seconds. It is used as an ordinary road bridge and was intended for the passage of ordinary teams, but it is located where there is a great deal of heavy hauling and has been found equal to the demands made upon it. A 20 ton steam roller was taken over it without serious deflection. It is very much cheaper than the usual type of swing bridges, having cost but about \$40,000, including masonry. Other bridges of the same type are now under contemplation in various places. The engineer and the contractors were complimented highly on the manner in which they had met and solved the engineering problems encountered in the construction of this decided novelty. The engineers were afterward favored with a trip on Lake Michigan, four miles out, arriving in the city early in the evening.

Thursday morning's session was opened by President Cox. The first paper presented was "Contribution to the Theory of the Steam Engine," by V. Develshauvers Dery of Liege, Belgium, which was read by the secretary.

Next came a paper on "Limitation of Engine Speed," by C. T. Porter of Montclair, N. J., to whom is due the Porter-Allen engine, which was also read by the secretary. A written discussion of this paper was sent in by A. K. Mansfield of the Buckeye Engine Company, Salem, Ohio, who recognized with Mr. Allen a reaction against high-speed engines. It was orally discussed by W. S. Aldrich of Burlington, N. J., who dwelt on the importance of having the piston speed proportioned to the flow of steam, and by Alfred Vander-

stegen of Belgium, who did not altogether agree with the conclusions of the author, believing that it was possible to run an engine at very high speed without wearing or knocking if well constructed, instancing the Willans central valve engines, shown in both the American and English sections at the exposition.

"Compression as a Factor in Steam Engine Governing" was the title of the next paper, read by F. H. Ball of New York, who said that he would be glad for some reasons to shield himself behind Professor Jacobus of the Stevens Institute, whose name had been announced as joint author, but that he would have to assume the responsibility of the sole authorship. On the same subject A. K. Mansfield submitted a paper on the "Relation of Clearance and Compression in a Compound Engine." Professor Jacobus then spoke on cylinder condensation and experiments which were being made by Mr. Ball. Professor Barr of Cornell University illustrated by a diagram the loss of indicated work as compared with the gain by compression. Professor Jacobus asked to be set down as disagreeing with the professor's conclusions. Mr. Cedarholm, in a diagram, described slightly different curves from those drawn by Professor Barr, claiming that they would be shown correct by actual practice and would to some extent modify the conclusions reached, dwelling particularly on the effect of friction. Professor Barr stated that he was alluding to but one element in the problem.

"Performance of a Triple Expansion Pumping Engine, with and without Jackets," was the title of a paper by Prof. J. E. Denton of Stevens Institute, which was read by Professor Jacobus. It was discussed by Mr. Ball, who did not think it safe to compare engines on the basis of the difference between the actual and theoretical area.

Prof. Geo. R. Alden of Worcester asked if the steam was superheated in the receiver; but that was not known. A. M. Mattice of Cambridgeport, Mass., thought the keynote of the differences in work shown was found in the steam pressure and was not due to the jackets, the steam pressure having been shown to have varied from 113 to 151 pounds. He also called attention to the effect of the heated jacket water passing back to the boiler in reducing the consumption of fuel while raising the steam pressure. Wm. Kent of New York asked for some additional information with regard to the Sultz engine, but it was not available in the absence of Professor Denton.

Geo. H. Barrus of Brston said he would be sorry to have the Sultz engine go on record without the good showing also made by American pumping engines, and submitted a number of tests of American engines for that purpose.

A paper on the "Performance of Street Railway Power Plants," by Wm. A. Pike of Minneapolis, and T. W. Hugo of West Duluth, was read by Mr. Pike. Geo. H. Barrus sent in a written discussion of this paper, in which he stated that other tests of triple expansion engines had shown much better results and called for further information, asking how the authors accounted for the good work done without jackets as compared with that done when jackets were used. He also objected to the term "tri-cylinder engines," used instead of the common name, "triple expansion" engines. Other criticisms were made which showed very clearly that Mr. Barrus did not regard the conclusions of the authors

as of any value. George I. Rockwood of Worcester, Mass., also sent in a written discussion, in which he dwelt upon the defects shown in the operation of the engines in performing their work, and argued in favor of the employment of smaller compound engines of the same aggregate power. Jesse M. Smith of Detroit said that both these critics had evidently overlooked the fact that these engines were used in operating an electric railway, which is unlike any other work an engine is required to do, unless it is running a rolling mill, the work varying from the friction of the engine to its ultimate capacity. Under the circumstances these engines showed excellent economy.

F. A. Schaffer of New York, T. W. Hugo of West Duluth, Minn., W. S. Aldrich of Burlington, N. J., E. T. Cedarholm of Chicago, C. W. Nason of New York, and H. H. Reist of Lynn, Mass., also participated in the discussion.

The next paper was on "An Evaporative Surface Condenser," by Prof. James H. Fitts of Agricultural College, Blacksburg, Va. Professor Fitts was killed in a railroad accident while on his way to attend the meeting of the Mechanical Engineers. It was read by the secretary and discussed by W. S. Aldrich, who alluded to the loss sustained in the death of Professor Fitts, and paid a high tribute to the value of the investigations made by him.

George H. Barrus of Boston read a paper on "A Coal Calorimeter," which was discussed by Jesse M. Smith of Detroit and A. A. Carey and Wm. Kent of New York. Mr. Kent called attention to the remarkably accurate results attained in Mallet's coal calorimeter, recently brought out in France, and dwelt to some extent on the difference between the volatile coal of the West and anthracite coal, with the deduction that scientific investigations should be made to establish their exact relative value as fuels. Past President John E. Sweet also made some remarks on the subject.

The paper of T. W. M. Draper of New York, on "Anhydrous Ammonia Gas as a Motive Power," was read by the secretary. It was discussed by Prof. De V. Wood and Wm. Kent.

Friday morning's session opened with past President John E. Sweet in the chair. The first paper presented was on "A General Engineering Classification and Index," by Wm. L. Chase of Worcester, Mass., which was read by the author. S. W. Baldwin of New York, in a written communication, suggested an international committee to devise an index.

Thos. H. Brigg of Bradford, England, then read a paper on "Haulage by Horses." Prof. Robert H. Thurston of Ithaca, N. Y., believed that the subject is not only interesting and important, but important to an enormous extent. More millions of capital are interested in the proper application of power in the haulage by horses than by steam. To get the highest efficiency from horses we must improve the methods of attaching these animals to vehicles. He gave some interesting personal experiences to emphasize his views. Secretary Hutton said that the great problem encountered in getting the highest efficiency from a horse was that he had to carry his own weight in addition to drawing the load and endorsed the remarks made. President Shortall of the Illinois Humane Society moved that Mr. Brigg\* be requested to

repeat his lecture at some time to suit his convenience before an audience of a more general character, which was adopted. Professor Shaw of Liverpool, England, added some interesting remarks on the same subject, which he illustrated by diagrams showing the different effects produced by attaching the moving force to different parts of a vehicle.

The paper by C. Linde of Munich, Germany, on "The Refrigerating Machine of To-Day," was read by Mr. Sorge of Chicago. Professor Jacobus of the Stevens Institute answered the criticism on himself and Professor Denton made by the author in a foot note (page 19 of the printed paper issued by the society), while Mr. Sorge defended Mr. Linde's conclusions. A resolution was then proposed by Mr. Sorge that the society appoint a committee to decide on standard rules for testing refrigerating machines, the committee to correspond with the Polytechnic Society of Munich. The resolution was referred to the council.

The paper by F. H. Daniels of Worcester, Mass., on "Rod-Rolling Mills and Their Development in America," was read by Secretary Hutton.

Prof. R. H. Thurston of Ithaca, N. Y., had prepared a paper on "Technical Education in the United States," but instead of reading it he made a most brilliant address on the subject, in which he gave interesting historical facts regarding ancient technical schools, dwelt upon the great work now being done by the technical schools of this country, and gave his views with regard to the work to be done in the future. Wm. Kent of New York spoke in favor of the establishment of a national university, and touched on manual training and some other phases of the question of technical education. H. F. J. Porter of the machinery department of the World's Fair introduced a resolution in favor of a uniform system of technical education, and a recommendation that colleges and technical schools confer the degree of "bachelor of engineering" only, leaving to some body to be designated by the various engineering societies of this country and Canada the right to confer the title of "engineer." Chas. H. Manning of Manchester, N. H., gave some facts concerning the United States Naval Academy in addition to those stated by Professor Thurston.

J. Wendell Cole of Columbus, Ohio, spoke of the very broad foundations now being laid by the technical schools. W. F. Durfee of West New Brighton, N. Y., thought that there should be a natural selection by the conductors of technical schools, so that only boys really fitted for engineers would be educated by them, to prevent incompetent engineers from being turned out. G. I. Alden of Worcester, Mass., also made some remarks in the same line. The resolutions of Mr. Porter were then referred to the council.

Professor Goodman of Yorkshire College, Leeds, England, outlined the difference between the standing of graduates of technical schools in the United States and Great Britain, stating that in the United States greater advantages were secured. In Great Britain manual training has thus far not been a feature of technical schools.

President Coxe urged that the fundamental principle of technical schools should be thoroughness in training in rudimentary elements. This is what makes a man a reliable engineer. He should be well grounded in mathematics, physics, chemistry, and have

some knowledge of drawing, but in the three branches named he should be most thoroughly taught.

The discussion was then closed by Professor Thurston, who called attention to the fact that education was constantly becoming more costly, and required helpful work in the maintenance of technical institutions through the influence of the alumni, which should be brought to bear on those able to contribute to their endowment, and also on State legislatures and Congress, in the more liberal support of institutions requiring State aid.

The paper by A. Huet, "Notes on the Drainage Machinery of the Netherlands," was read by title, and there was no discussion.

On Friday evening Chief F. R. V. Skiff and staff and the exhibitors in the Mines and Mining Building, World's Fair, gave a reception in the building to the associated engineering societies and ladies accompanying the members. The building was brilliantly illuminated, and the various exhibits were open for inspection. The mining machinery, diamond washing, diamond cutting and other interesting moving exhibits were in operation. Music and a collation were provided for the further entertainment of the engineers.

#### Closing Session of the Engineers.

On Saturday morning the members of all the divisions of the Engineering Congress assembled in the Hall of Washington, in the Art Palace, for a joint closing session. The large hall was well filled. O. Chanute presided. He congratulated the engineers on the enormous amount of work done during the week. The closing session would be devoted to a brief account of the results of the different divisions.

Wm. Metcalf responded first for civil engineering. There were 63 papers presented in this section, covering a great variety of subjects, embracing common roads, railroads, waterways, electric-light plants, &c. Twelve countries were represented and the average attendance at each session was about 125. He had never seen more interest displayed in the proceedings of an engineering society than on this occasion.

Eckley B. Coxe reported for the mechanical engineers. The interest taken in the papers and discussions was very far beyond what is ordinarily manifested at such meetings. He was impressed by the tendency of modern engineering to exact facts and not to speculative theories. The construction of machines by guess seems to have passed away. He looked forward with much interest to the inauguration of a system of international testing, so that the work done in one country can be properly compared with that done in others.

Dr. R. W. Raymond made the report for mining and metallurgical engineering. The papers presented in these divisions were discussed with very great interest. While the attendance was not so great as in other divisions, he could only say that their attendance had been the pick of the engineers, while the residuum had gone to the civil engineers. He paid his respects to the discover, claiming that he only stumbled on things, and complimented the practitioners who were appointed by Almighty God to help him make the world. The try and practice had gone hand in hand in the sessions of these two divisions. They had made no discovery, but they had made progress. He begged pardon, one discovery had been made—they had discovered one

\* Mr. Brigg is the inventor of a device for assisting in the proper exercise of power by horses, which is shown in Section G 55, Transportation Building, World's Fair.

another. It is worth something to look into the face of a man who has written a paper. The witnesses have been looked in the face and the impressions made have been stronger. He closed with an expression of thanks to the General Committee for the admirable arrangements they had made.

C. Frank Allen reported for the division of engineering education. In some respects they had been at a disadvantage. There had not been as determined an effort made to secure attendance, but nevertheless the interest shown had been very great, and the papers presented were as valuable as those of any section. One point was the treatment of mathematics. The object of education in this branch, it was agreed, should be not "how much," but "how well." Constant drilling was urged. Graphical methods were dwelt upon in instruction, and attention was called to the fact that there is no text book on this subject. Results are better with department libraries in institutions of learning than with large libraries used by all the students. There was great difference of opinion on field work, but the consensus of opinion was in favor of field work on one day of the week rather than devoting several hours of each day to this purpose. The question of laboratories and shops came up and the opinion was sustained that shops should not be kept up for gain, but for instruction primarily, with, of course, some end in view of disposing of the work done, while laboratories should be sustained not only for instruction but for original research, which would often produce results of great value. Comparisons were made somewhat to the disadvantage of American schools as compared with foreign schools on account of the better preliminary training of those entering the latter.

Major Clifton Comly spoke for military engineering. Their sessions had been fairly attended and had been of great interest. There were in all 37 papers, most of which had been contributed by officers in our own service, but quite a number had been received from foreign military engineers. The report of the proceedings would be made to the Secretary of War.

Geo. W. Melville reported for marine and naval engineering. The average attendance per session was about 70. The papers were contributed by the most able marine engineers and naval architects of Europe and this country. The discussions were productive of mutual benefit, and the publication of the proceedings will add greatly to the value of the literature on these subjects. John Wiley & Son of New York will publish these proceedings in book form, trusting to the sale of a sufficient number of copies to reimburse them. This will be done because this division had no strong organization back of it to undertake the expense of such a work.

Mr. Chanute hoped that the work of this congress would not terminate with these sessions, but be continued. He introduced Baron de Rochemont of France who presented the following resolution:

*Resolved*, That a uniform system of testing materials is desirable for the purpose of exact comparison.

The motion was carried unanimously after some explanatory remarks by the Baron, who gave instances of widely divergent results obtained by different methods of testing the same materials.

Speeches were then made by Professor Unwin for Great Britain, who

among other things said that this was the first occasion of the kind giving a place to engineering education; A. Flamant, for France, who paid a high tribute to American progress in engineering; Professor Hartmann, for Germany, who said that the success of the past week's meetings was of universal importance; Professor Reuleaux, who also responded for Germany, dwelling particularly on the work accomplished in the erection of the exposition buildings; N. Soliani, for Italy, who expressed his appreciation of the importance and benefit of the congress, and said that the expectations of himself and his associates had been surpassed; Chevalier Capacci, who also responded for Italy; Prof. Nicholas Vosnessensky, for Russia, who spoke of the similarity of engineering problems in Russia and America, owing to the great distances to be traversed in both countries; Feliks Rycerski of Warsaw, Poland, who also spoke for Russia, and characterized American engineering as embodying in the highest degree simplicity and practicability; Prof. Wm. Ritter, for Switzerland, who admired the ability of American engineers in adapting themselves to their peculiar conditions, so different from those prevailing in Europe; Alfred Vanderstegen, for Belgium, who spoke of the courtesy shown to foreign engineers and hoped that American engineers would visit the Antwerp exposition next year; Jorn Bergendal, for Sweden, who said that the ocean did not separate, but united the New World with the Old World, and that Sweden had something to learn from this country in the manufacture of iron and steel. Other countries were called for but their representatives were absent. The session then closed.

During the late Engineering Congress in Chicago the division on engineering education organized a "Society for the Promotion of Engineering Education," and elected the following officers: President, DeVolson Wood; vice presidents, George F. Swaine and George B. Christy; secretary, J. B. Johnson; treasurer, Storm Bull.

#### Magnetization of Steel Rails.

M. Vinot, a French engineer, has contributed to the *Industrie Electrique* the results of some experiments made by him in regard to the magnetization of steel rails. M. Vinot took for his experiments a portion of the line of the Compagnie du Midi between Bordeaux and Cette, the left-hand track serving for the trains coming from the latter town, while on the right-hand track the trains run in the opposite direction. On the experimental section chosen the rails were laid in a direction perpendicular to the magnetic meridian, or, in other words, from west to east, and it was found that when a pocket compass was placed on one of the joints of one of the lines of rails of the left-hand track, the needle pointed exactly in the direction of the line of rails, the north pole being turned toward the town of Cette. With the same compass similarly placed on the right-hand track the needle again pointed in the direction of the line of the rails, but the north pole this time was turned toward Bordeaux. The distances between the rail ends varied from about  $\frac{1}{16}$  to  $\frac{1}{8}$  inch producing a very perceptible shock on the passage of trains, due to the respective depressions and elevations of the ends of the rails and their influence on the car wheels, and these shocks, it was

concluded, developed a south polarity in those rail ends in which the concussion took place.

#### Ships Building for the Navy.

A press dispatch from Washington gives the following details in regard to the war vessels now under construction for the United States navy: Chief Naval Constructor Hichborn has no easy task before him in his new office. He finds at least two of the ships which have been accepted, and one of which has been placed in commission, the "Monterey" and "New York," incomplete. It will take another three months to finish the "Monterey," and two months' work still remains to be done on the cruiser "New York," although that ship went into commission to-day. The "Detroit," also in commission, requires about a month's more work. The other ships in various stages of construction are as follows:

Name.	Class.	Tons.	Months to complete.
"Montgomery".....	Cruiser.....	2,000	4
"Marblehead".....	Cruiser.....	2,000	6
"Cincinnati".....	Cruiser.....	3,183	6
"Kaleigh".....	Cruiser.....	3,183	6
"Columbia".....	Cruiser.....	7,350	9
"Olympia".....	Cruiser.....	5,500	8
"Maine".....	Armored cruiser.....	6,648	4
"Texas".....	Battle ship.....	6,301	10
"Katahdin".....	Ham.....	2,183	12
"Massachusetts".....	Battle ship.....	10,200	24
"Indiana".....	Battle ship.....	10,200	24
"Ericson".....	Ferryboat.....	120	6

There are still on the stocks, in various stages of completion, the following vessels:

Name.	Class.	Tons.	Months to complete.
"Oregon".....	Battle ship.....	10,200	30
"Iowa".....	Battle ship.....	11,296	36
"Brooklyn".....	Armored cruiser.....	9,150	36
"Minneapolis".....	Cruiser.....	7,350	24

An appropriation was made last March for three gunboats of 1200 tons each, and designs are now being prepared in the bureau. Plans for four second-class torpedo boats to be carried by the "Maine" and "Texas" are also in preparation. The "Puritan," "Amphitrite," "Terror" and "Monadnock" are approaching completion at the navy yards. Work has been carried on on these vessels since 1888, and that they have not been completed long ago is because the armor contractors have not delivered the material.

H. L. Hollis & Co., chemists and mining engineers, of Chicago and Cleveland, have added to their business a new department—namely, the remodeling and improvement of blast-furnace plants and practice. They have associated with them E. C. Potter, formerly of the North Chicago Rolling Mill Company and the Illinois Steel Company, and F. A. Emmerton, formerly of the Joliet Steel Company and the Illinois Steel Company, whose experience and achievements in this particular line are a guarantee that this new department will be carefully and intelligently handled. They have also secured the services of Michael Smith, for 16 years a furnace manager of the North Chicago Rolling Mill Company. The growing demand for improvement in blast-furnace practice has induced Hollis & Co. to make this new departure, and thus equipped they should be able to greatly widen their field of usefulness, to the mutual advantage of all parties concerned.



## Rod-Rolling Mills and Their Development in America.\*

BY FRED H DANIELS, WORCESTER, MASS.

The subject of rod rolling in America, prior to 1876, attracted little attention except among the various wire manufacturers; although the introduction of Bessemer and open-hearth steel for wire purposes, as early as March, 1871, at the Grove street works of the Washburn & Moen Mfg. Company, was the initiation of a development of the rod-rolling industry in this country.

The substitution of Bessemer and open-hearth steel for puddled and charcoal iron gave to the rod rollers and wire manufacturers the ideal material from which to produce wire rods and wire, furnishing a product which was far less expensive and also more satisfactory.

United States, combined to revolutionize the wire-rod rolling mill. The part which barbed wire and nails have played in this revolution can be best illustrated by a statement of growth. In 1874, from an output of about 5 tons of barbed wire, the production has reached a total yearly for the United States of about 200,000 gross tons; and the production of wire nails, the use of which was scarcely known in this country ten years ago, except to importers of crated and boxed goods, who had to wrestle with the toughness and holding qualities of the German and French wire nails, has now reached a sum total yearly of 200,000 gross tons, and is rapidly driving the cut nail out of the market. The increased demand for wire rods rendered larger productions imperative and stimulated competition among the various mills. Hence very rapid developments have taken place up to the present time.

mills were rapidly built throughout New England and the Middle States, the product being employed chiefly in making nail rods, pins and card wire.

This system of producing wire rods remained in vogue, without material advancement, until between 1830 and 1840. One of the first improvements, if not the first, was made at Fall River, where a rod mill was built by the Fall River Iron Works Company. The original mill was erected in 1839, and an addition made to it in 1841. This mill was driven by bevel gears. It was destroyed by fire and rebuilt in 1843. The power for the new mill was communicated from the engine by belts. This mill had a system of pulleys of different sizes, so that the speed could be changed when required. The train consisted of three sets of rolls, and the reel was turned with a hand crank. The output of the original mill was about 3 tons per turn, of rods not smaller than  $\frac{1}{4}$  inch,

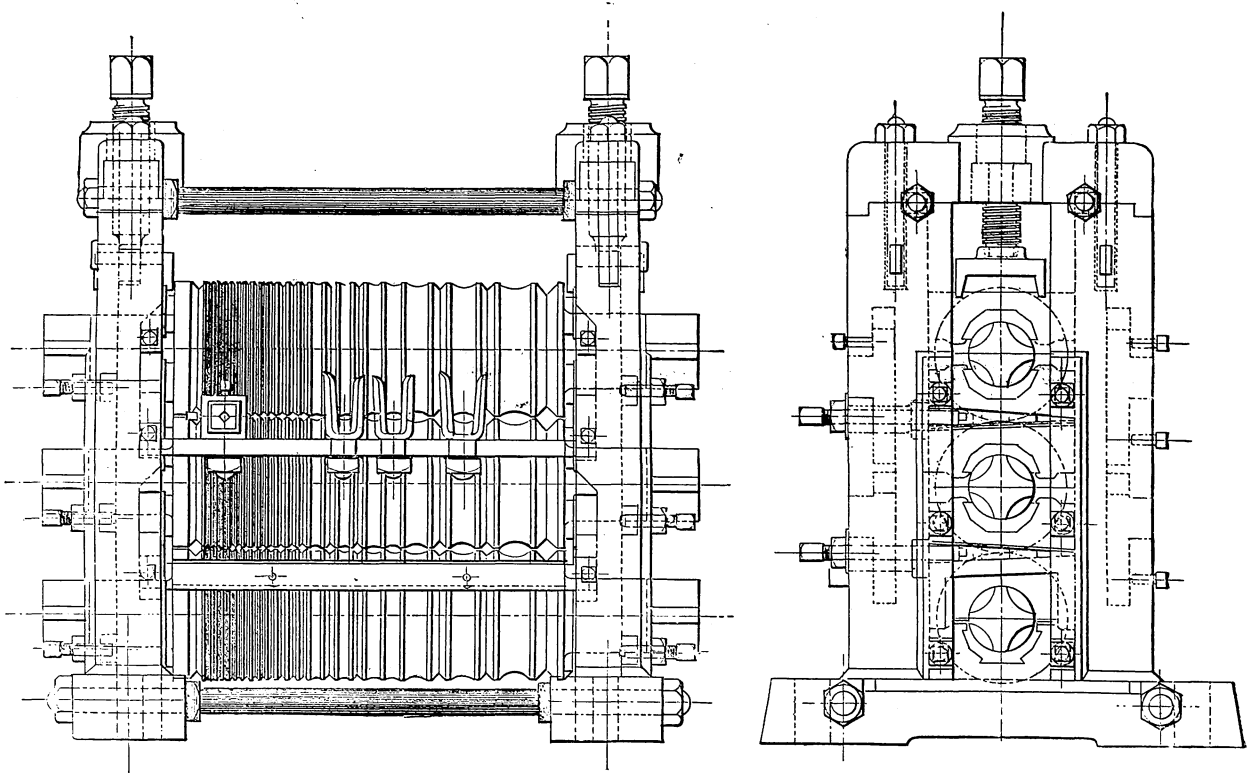


Fig. 1.—Roughing Roll Stand, Quinsigamond Old Rod Mill.

### ROD-ROLLING MILLS AND THEIR DEVELOPMENT IN AMERICA.

It is a remarkable fact that this beginning of modern American wire-rod rolling occurred only two years previous to the first manufacture of barbed wire, which was in the fall of 1873, at DeKalb, Ill. J. F. Glidden then produced a few hundred feet, but the process was very crude when compared with the present effective and rapid methods.

Previous to 1873 wire fencing was made in considerable quantities for the West, largely from puddled and piled scrap iron, Nos. 8 and 9 drawn wire; but this material did not give complete satisfaction. The perfecting of machinery for cheaply producing barbed fence wire during the years from 1873 to 1876, by the Washburn & Moen Mfg. Company, and, shortly after, the introduction of wire nails into this country, coupled with the installation of Bessemer and open hearth steel plants in the

Wire drawing was one of the early industries introduced into America, as early as 1666 (according to Bishop). The wire was used largely for the manufacture of pins and wool cards. Wire rods were unknown at that time, as the use of grooved rolls, so far as we are informed, had not been suggested or had not been reduced to practice. The wire drawer in those days depended upon the rolling and slitting mill for his rolled product. Charcoal iron, made directly from the ore and rolled into plates, which were sheared into strips or square rods, formed the supply for the pioneer wire drawer. This was, without doubt, the universal practice in Europe until the year 1783, when Cort patented and introduced the use of grooved rollers, thereby originating what has since become one of the most successful and important inventions for reducing metals into all kinds of forms and shapes. Very little was accomplished in this country, however, in rolling and slitting until after the Revolutionary War, when rolling

the coils weighing about 10 pounds. The billets were  $1\frac{1}{4}$  inches square, and made either from piled scrap, puddled, or charcoal iron.

After the mill was rebuilt in 1843, with better driving facilities, increased speed and diameters of rolls, and the introduction of belts to drive the mill, the weight of the billet was increased to about 25 pounds, and rods were rolled as small as  $\frac{3}{8}$  inch in diameter. The mill was never changed after being rebuilt, and the production was from 5 to 8 tons a day, depending upon the size of rods. (I am indebted to Philip D. Borden and Robert C. Brown of Fall River for the above information.)

Mills after the Fall River design were erected in various parts of the United States by the Roeblings, Providence Iron Company, Henry S. Washburn & Co., Cooper, Hewitt & Co., Windsor Locks Company, and at Troy and other places. Probably the best illustration of the form of mill that was in general use in America from 1830 to 1860 is found in that built by Ichabod and Charles

\* Presented at the Chicago meeting (August, 1893) of the American Society of Mechanical Engineers, and forming part of Volume XIV of the *Transactions*.



Washburn at Quinsigamond, now the Quinsigamond Works of the Washburn & Moen Mfg. Company (see Figs. 1, 2 and 3). This mill was driven either by a water wheel or by steam, as desired. There was much rivalry in those days between the various rod mills, and when the Quinsigamond mill produced a little over 9 long tons of No. 4 wire rods, 20 to 30 pounds per

doubt accounts for the light weight of billet used up to that time. The reel was also turned by hand.

The demand for telegraph, suspension bridge and rope wires in long lengths caused the manufacturers of wire rods to give careful attention to the question of improved rod-rolling facilities.

Ichabod Washburn, during a visit to England, made the acquaintance of

ments in the direction of rolling wire rods continuously, at the Richard Johnson & Nephew Wire Works, and he became very enthusiastic regarding the possibilities in this direction. In addition to the advantages to be derived from wire rods in long lengths, Messrs. Bedson and Washburn at an early date perceived the possibilities of rolling wire rods of small cross section, as small, if not smaller, than No. 8 wire gauge. Mr. Washburn decided that a Bedson mill would be of great advantage to his company, and he personally assumed the responsibility and expense and contracted for a mill. In the fall of 1869 one of Bedson's continuous wire-rod rolling mills was erected at the Grove street works of the Washburn & Moen Mfg. Company (Fig. 4). Applications for patents on this system were filed in the United States Patent Office, but the main invention was anticipated by a similar invention made in the United States by Henry B. Comer.

In patent No. 23,425, dated March 29, 1859, Mr. Comer described his improvement as follows:

The nature of this invention consists in a mechanical arrangement for rolling iron, by causing the iron to be rolled to pass between a series of rolls and through guides, the grooves in the rolls and the form of the guides being adapted in form and size to the article desired.

Claim—Finishing rolls which are placed in front of each other and on parallel lines, with guides placed between each set of rolls, said guides being so constructed that they will guide and change the position of the iron as it passes from one set of rolls to another set, as described and set forth.

Mr. Washburn immediately obtained the Comer interest by purchase. It has always been considered by the Washburn & Moen Mfg. Company that Comer was the first to propose in the United States the continuous rolling system, and that Bedson was the first in England; Bedson, however, having the credit of reducing the invention to practice and successfully installing, both in England and America, the system for continuously producing wire rods.

All attempts made by Comer in the direction of continuous rolling were failures. George Bedson, after repeated experiments and persistent endeavors, overcoming almost insurmountable obstacles, succeeded in installing a mill at Manchester which was a success, producing telegraph wire rod in bundles of 100 pounds and over, and as small as No. 8 wire gauge. (This mill, as originally built, is fully illustrated in Fig. 4.)

The billets, 1 to 2 inches square, were heated in a Siemens gas furnace, which was from 18 to 30 feet long. The first pair of rolls in the continuous train were located about 2 feet from the delivery door of the heating furnace, the billets being charged into the furnace from the opposite end. The billet, after passing continuously through the several pairs of rolls, was delivered in an oval shape from the last pair of continuous rolls and was seized with tongs by a workman, who looped the rod and introduced the first end into a finishing pair of rolls, which finished the wire rod. The finishing pair is not shown in the plate.

Mr. Bedson desired that the entire system, from the billet to the wire rod, should be continuous, and added a finishing pair of rolls in the line of the continuous train. A trial was made, which was successful, and the rollers were instructed to continue by this system. Returning in the afternoon, Mr. Bedson's English ire was aroused by discovering the finishing rolls removed and

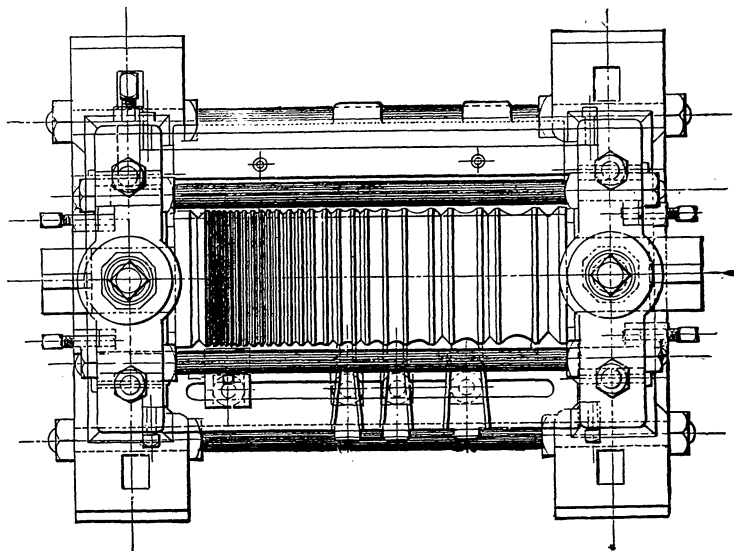


Fig. 2a.—Plan of Roughing Stand.

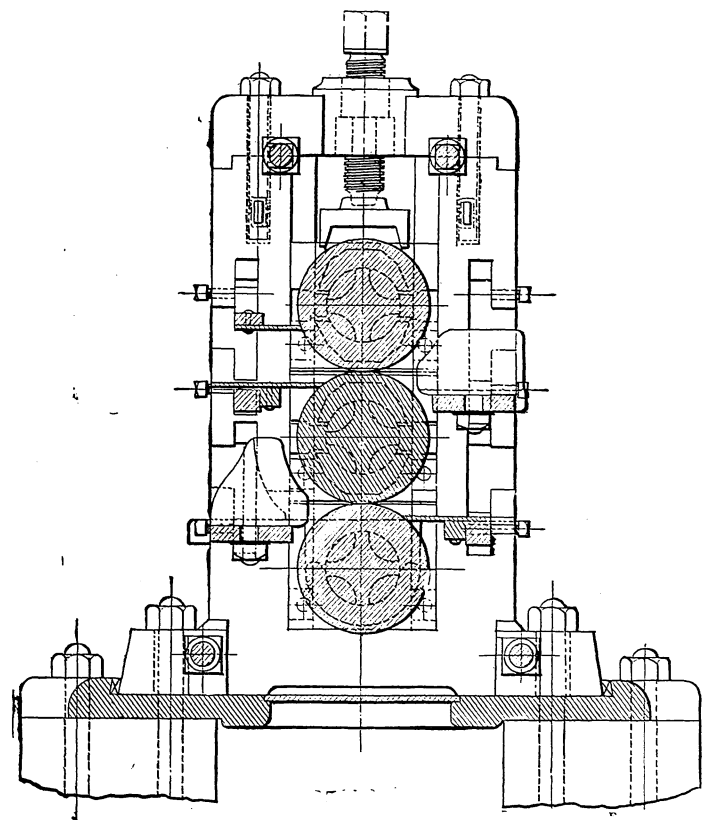


Fig. 2b.—Section of Roughing Roll Stand, Quinsigamond Old Rod Mill.

#### ROD-ROLLING MILLS AND THEIR DEVELOPMENT IN AMERICA.

bundle, in one turn, it was considered a very remarkable output, and was the banner record for many years. I am informed by William Garrett that he has lately produced at Joliet, in one turn of ten hours, as high as 314,000 pounds, or 140 long tons, of No. 5 rods, 150 pounds per bundle. All of this increase in 20 years.

Until 1860 looping mills were unknown, the billet being passed through the rolls back and forth, and this no

George Bedson, superintendent of the Richard Johnson & Nephew Wire Works, Manchester. Washburn and Bedson afterward became warm friends, and an extensive correspondence and exchange of ideas regarding wire making passed between them. Bedson was, without doubt, the best informed and most skilled wire and rod expert in Europe. Mr. Washburn was informed by Mr. Bedson from time to time during the sixties regarding his experi-

the mill running according to the old system. The writer was well acquainted with Mr. Bedson (now deceased) and well remembers the pleasure Mr. Bedson had in relating how he overcame the opposition of the workmen to this innovation. He ordered the mill stopped, sent for mechanics, had the old finishing housing taken to the drop and broken into scrap, and the new finishing housing put in place. The rollers were then informed that there was the mill, and they could roll or not as they saw fit. Mr. Bedson encountered difficulty in obtaining the exact increase in speeds for the several pairs of rolls in his mill, but, after much experimenting, he reached a successful plan by which the surface speed of every pair of rolls was accurately determined. A billet of the required size was taken and the length measured exactly. This was heated and passed through the rolls of an ordinary rod-rolling mill the required number of times to reduce the billet to the size of wire rod desired, each groove being carefully proportioned for the proper reduction in area, and after each pass the piece was measured accurately. Thus the surface speeds of rolls were easily obtained by measuring the elongation after each pass. As stated before, it has been generally understood by the Washburn & Moen Mfg. Company and others that Comer was the first to suggest, and Bedson the first to reduce to practice in America, the continuous rolling-mill system, having twisting guides to conduct the metal from one pair of rolls to the next; and large royalties were paid to Bedson and to Comer for the use of this system. A short time ago the writer accidentally came across a patent in the United States Patent Office which up-

pigeon holes in the Patent Office. It was lately discovered by one of the examiners, and copies of the patent were printed. (This patent is to J. E. Serrell for making metallic tubing, No. 2918, patented January 20, 1843.)

metal, or mixtures of metals, or combinations of metal, into pipes or tubes, or into bars, rods, wire or other forms, by the operation of any number of pairs of grooves, beaded, indented, raised or hollowed rollers, either set in lines parallel to each other or at an angle to each other, or both angular

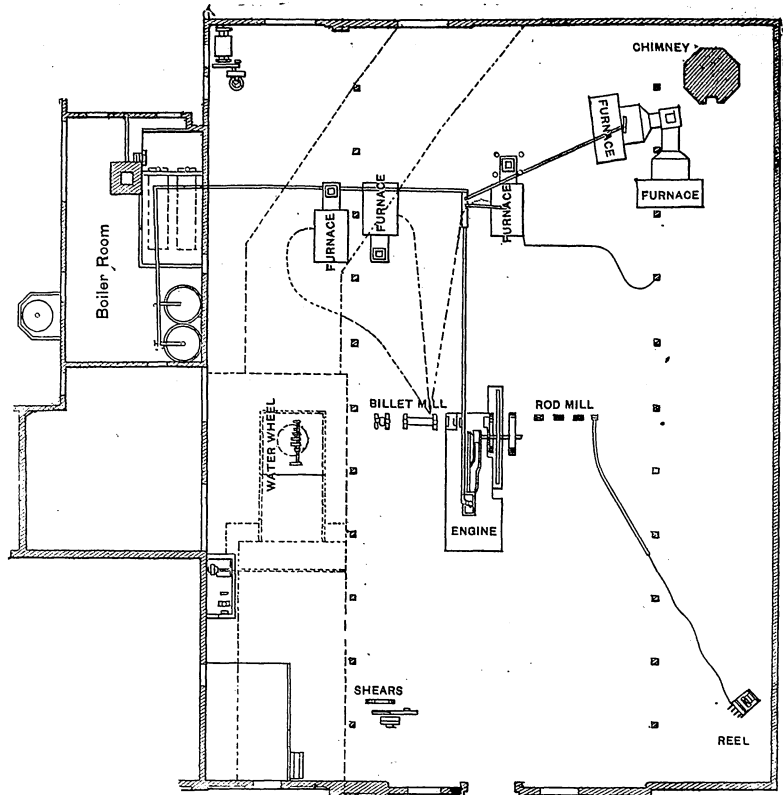


Fig. 3.—Ground Plan of Quinsigamond Rod Mill.

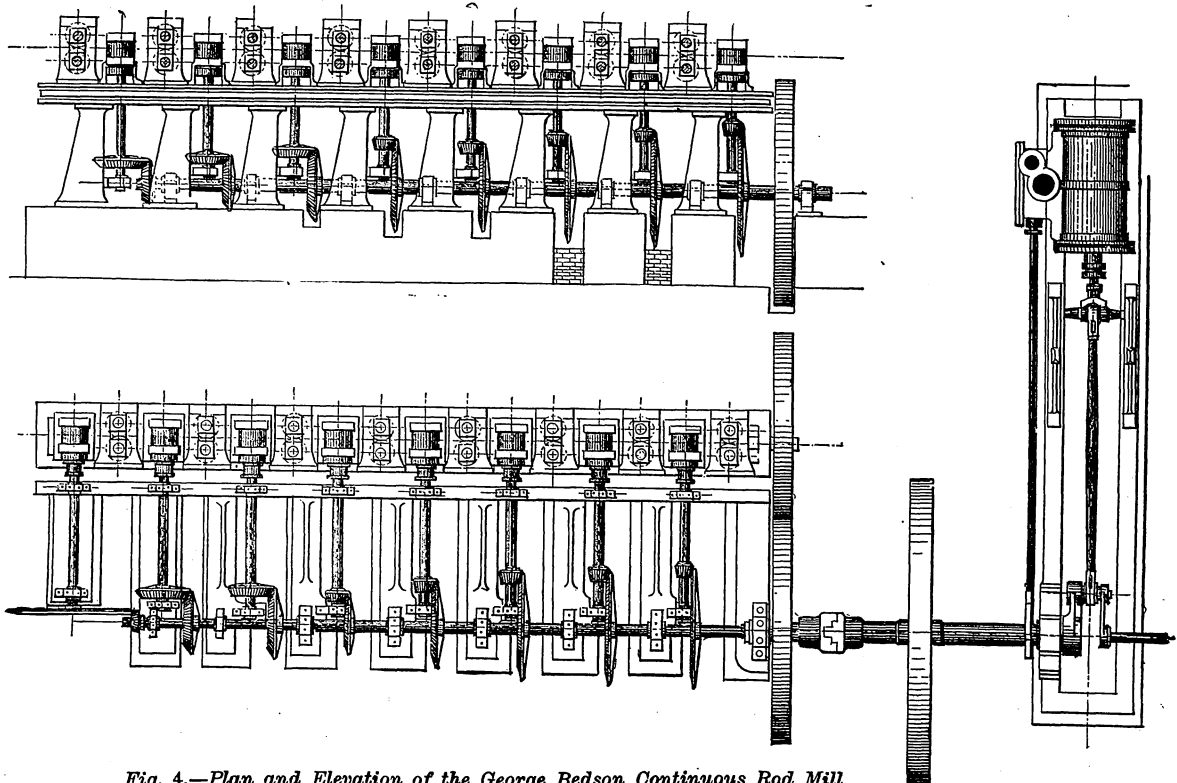


Fig. 4.—Plan and Elevation of the George Bedson Continuous Rod Mill.

#### ROD-ROLLING MILLS AND THEIR DEVELOPMENT IN AMERICA.

sets these conclusions and shows that the credit for the suggestion of continuous rolling and the reduction to practice belongs in the United States. This patent had been lost sight of for many years, the original manuscript having been tucked away in one of the many

Mr. Serrell certainly knew how to draw up a complete and comprehensive claim, and on account of its importance it is inserted here :

Claim 1. The arrangements and application of mechanical means, as herein described, for reducing pieces or ingots of

and parallel rollers combined, when such pairs of rollers or combinations of pairs of rollers travel, work or move at speeds successively increasing according to the amount of extension in length caused by the reduction of the area effected by each preceding pair of rollers, so that the finally required form of metal shall be reduced by the action

of the last pair of rollers on the metal or metals of any ingot operated on in the manner herein substantially described and set forth.

We are informed by Lemuel W. Serrell of New York, the well-known patent attorney, brother of the late J. E. Serrell, that the invention was perfected and put in use to a considerable extent in 1842 to 1845. The machine was used in the manufacture of lead

pipe closely upon the insulated wire. This machine was also used in the manufacture of lead pipe for Croton water, and considerable of it had a lining of tin that was cast as a tube within the lead ingot, and the two were drawn down together. Experiments were made with the machine in connection with the manufacture of wire rods for horse-shoe nails, but it was never used practically for that purpose. The Serrell

including the engines, erected at the Washburn & Moen Works in 1869, was built in England, and expert English rollers were employed to run it. The billets first used in this mill were 1½ inches square, but were gradually increased in length, from time to time, being at first 20 feet and later 28 feet, and were obtained from Europe, mostly from Sweden. The wire made from these billets was used principally for

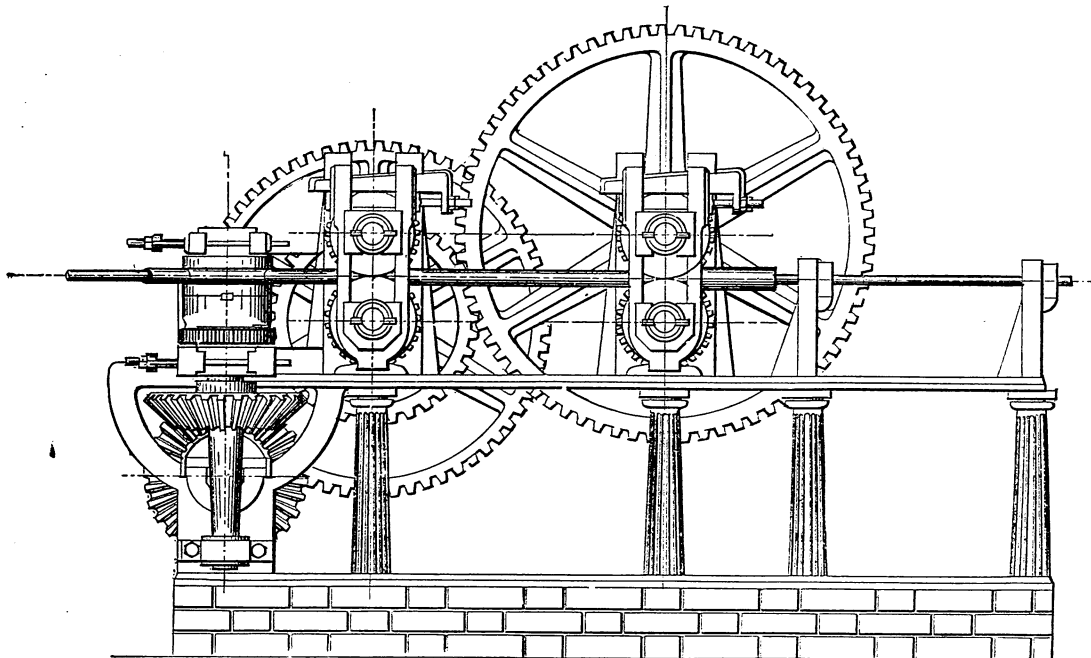
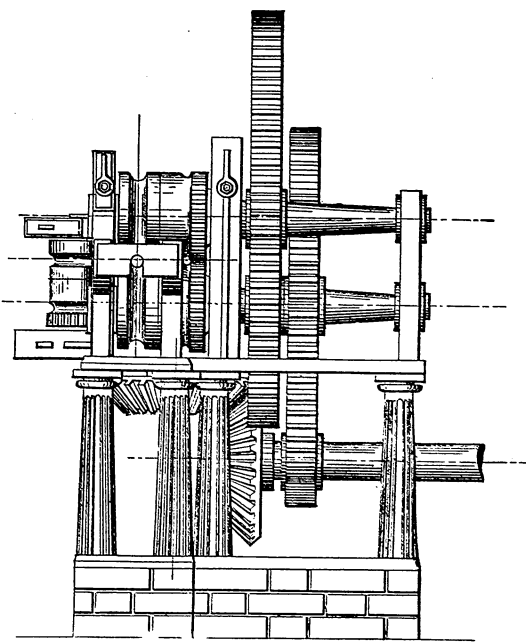


Fig. 5.—Front Elevation of the J. E. Serrell Continuous Mill.



End Elevation of Fig. 5.

#### ROD-ROLLING MILLS AND THEIR DEVELOPMENT IN AMERICA.

pipe, and considerable of the Morse telegraph wire first laid between Washington and Baltimore was prepared on this machine. That is to say, the speeded rolls were made use of, and they drew the pipe down from an ingot that was cast progressively in a mold by a column of melted lead, and the covered wire went through a stationary hollow mandrel, upon which the lead pipe was reduced quite thin, and the last two pairs of rolls pressed the lead

mill was operated on the corner of Canal and Elm streets, in New York City. (The Serrell continuous mill is fully illustrated in Figs. 5 and 6). Mr. Serrell, without doubt, was the first to employ rolls each speeded higher than the preceding, whereby continuous rolling was rendered possible, and it is evident that it was his intention to claim this, as broadly as language could express.

The Bedson wire-rod rolling mill,

telegraphic purposes. Mr. Washburn and others had great hopes for the future of this mill, believing that the problem of obtaining bundles of wire rods weighing 100 pounds and over was solved. The billets were heated in a Siemens gas furnace, one of the first erected in America, and the arrangement and design of both furnace and mill were similar to the first furnace and mill built by Bedson in England. The reeling facilities were the same that had been before used, the reel being turned by hand; but shortly after the Bedson mill started (or, more justly, the Serrell Comer-Bedson mill) a power reel, operated by a loose-running belt, a binder and a frictional device for stopping the reel was put in use. This suggestion, although simple, has been an important element in the development of rod rolling, increasing the efficiency and output and reducing the cost of rolling. (Fig. 7 illustrates the first power reel.) The power reel was soon introduced into the Cambria Iron Company's rod mill, and afterward adopted by Mr. Garrett, as well as by all the rod-rolling mills in the United States and by Mr. Bedson in England. Mr. Garrett utilized two such reels for reeling two rods from one pair of finishing rolls.

Few realize the difficulties which were encountered in operating a continuous rod mill, especially during the period prior to the introduction of Bessemer and open-hearth steel. It was impossible to obtain iron of uniform quality, sound and homogeneous, and it was up-hill work to obtain satisfactory results. The output was small, not exceeding from 8 to 10 tons a turn, and the cobbles and breakdowns were frequent and serious.

After persistent and continued endeavor, and by strengthening the gear-

ing, shafts, and in fact rebuilding the entire mill, the production was somewhat increased, yet the quality of rods from the mill was not satisfactory for telegraphic purposes. The only element which gave complete satisfaction was the increased weight of the bundle. It gradually became apparent to those who had to do with this mill that the continuous system was not suitable for rolling iron wire. This conclusion was reached about the time that soft steel was suggested for wire purposes. As before stated, in March, 1871, after rolling a few trial lots of steel billets on the Bedson mill, it was evident that

But other wire makers, during 1870 to 1880, were at the front in the line of improved rod-rolling facilities, among them being Cooper, Hewitt & Co. and John A. Roebling Sons Company. The old system of passing the rod back and forth was rapidly discarded after 1870 and the Belgian system of seizing the first end of the rod as it issued from the rolls was attempted, but only one or two loops in the rolling operation were undertaken at first, the other passes being back and forth. The adoption of this system increased the output, and also made it practicable to roll a heavier billet; and it was common practice in

Mfg. Company erected in 1876 a Belgian rod mill, on the back-and-forth and looping plan combined, and with a sloping floor for the loops. This mill was arranged to take billets from 4 inches square or smaller, and these billets were passed back and forth through three-high roughing rolls until a size about  $1\frac{1}{2}$  inches was reached, when they were passed through the Belgian train, where they were rolled to as small as No. 6. The output was as high as 20 to 40 tons in ten hours, depending on size.

There was a peculiarity in the system of heating, the first furnace being a

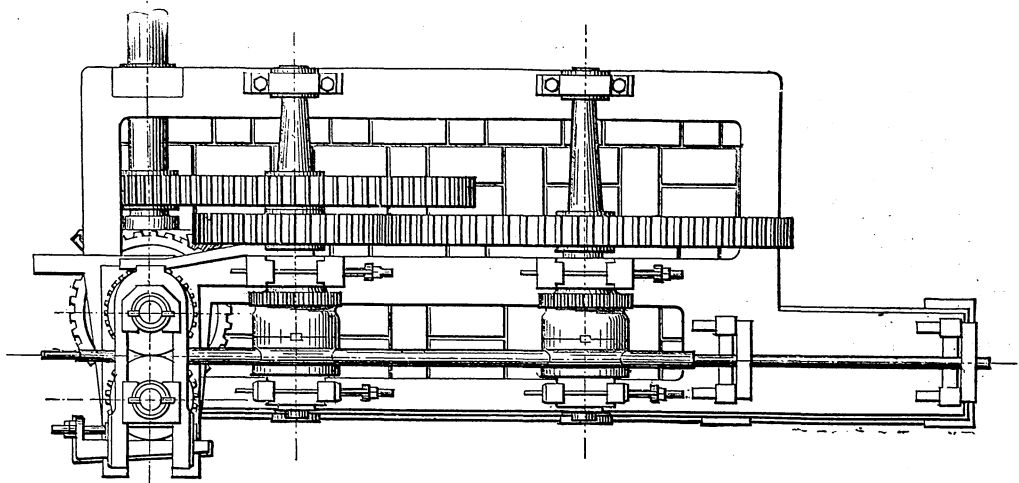


Fig. 6.—Plan of the J. E. Serrell Continuous Mill.

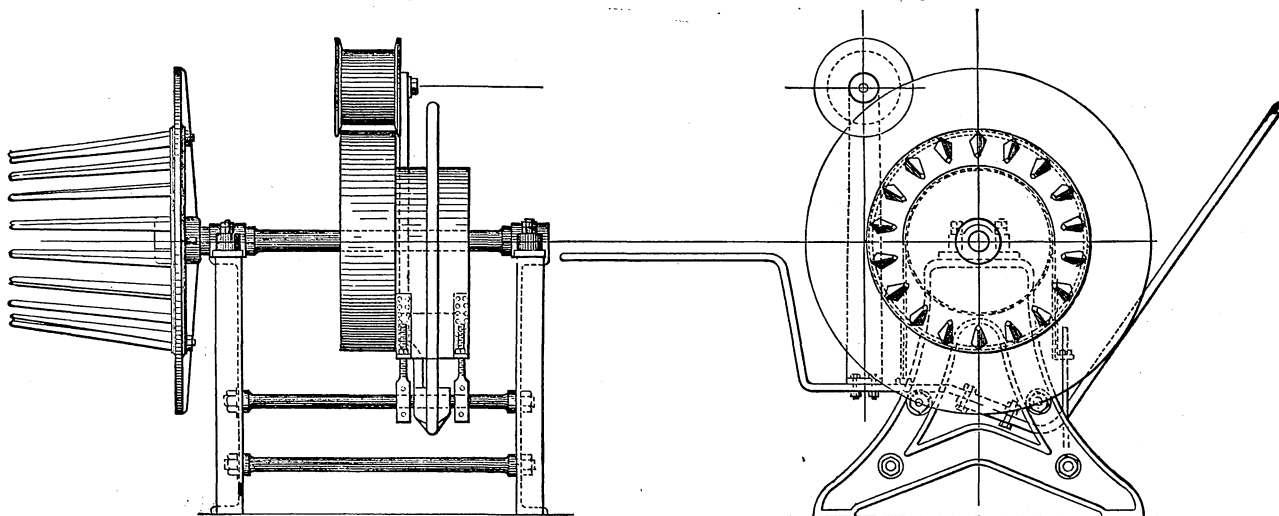


Fig. 7.—First Power Reel for Coiling Wire Rods.

#### ROD-ROLLING MILLS AND THEIR DEVELOPMENT IN AMERICA.

this material possessed the necessary homogeneity and tensile strength (which iron lacked), when in a heated condition, to be rolled continuously with success. Shortly after the introduction of steel, and about 1876, improvements were made in the engines for driving the mill and the speed of the mill was increased. These two changes increased the production to about 20 tons per turn. Later, in 1887, automatic reels were put in, doubling the production—that is, making it from 40 to 45 tons per turn. Better facilities for rolling wire rod have now taken the place of the Bedson mill, and in 1890 the entire plant was put into the scrap. (Figs. 8, 9 and 10 will illustrate the mill just before being dismantled.)

old mills to roll a double-length billet in the old length of furnace by bending the billet in the middle, so that the two ends came together, and straightening it out as it entered the first pair.

But with the introduction of steel wire billets new rod mills were erected throughout the United States, which entirely dispensed with the old back-and-forth system of rolling, a loop being formed between each pair of rolls. The introduction of this system and the power reel again increased the weight of billets to about 100 pounds, and the size of wire rods was reduced to No. 5, and in some cases to No. 6.

As the Bedson continuous system never gave satisfaction when producing iron wire rods, the Washburn & Moen

preheating furnace, the second heating the metal to the proper temperature for rolling, after transferring from the first to the second. We understand this mill to have been the first in America where four loops were formed at the same time, between two pairs of rolls. Of course, it will be understood that only one rod was finished at a time in this mill, as in this case each of the loops was formed from the same rod and represented the different reductions. Fig. 11 illustrates the mill known at Washburn & Moen's as the Belgian rod mill, originating probably in Belgium or Germany, and is the mill which has been in general use in Europe for years.

(To be continued.)

### The Old "Britton" Mill.

On the shore of Lake Erie, at Cleveland, Ohio, there stands to-day a rolling mill which has passed through vicissi-

after 40 years' existence, the old engines and machinery are tottering over a subterranean fire, which has slowly but surely gained headway in spite of all efforts to control it. In 1853 the

& Steel Company in 1879, and was operated successfully under the management of J. W. Britton until 1888, when it was again burned to the ground. Mr. Britton (now in his sixty-

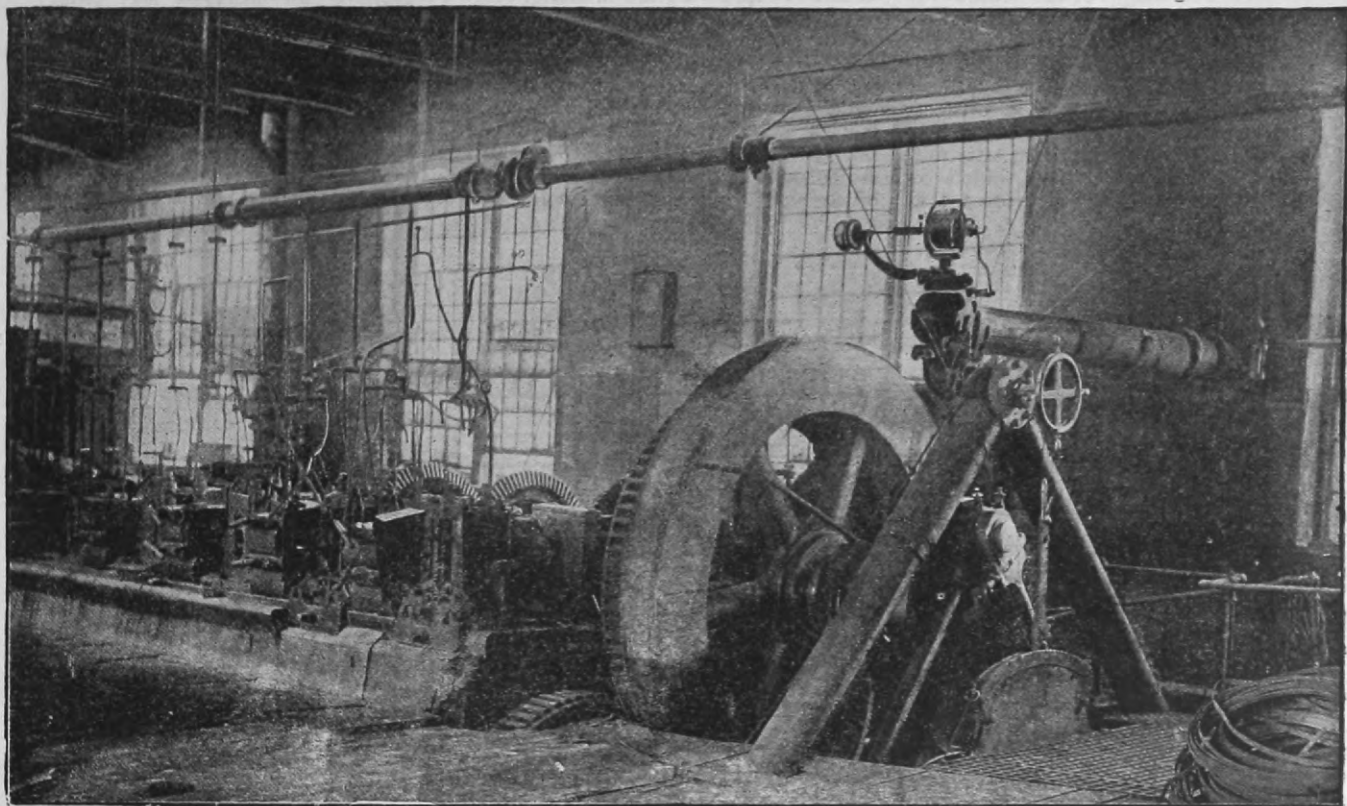


Fig. 8.—The Bedson Mill at Worcester.

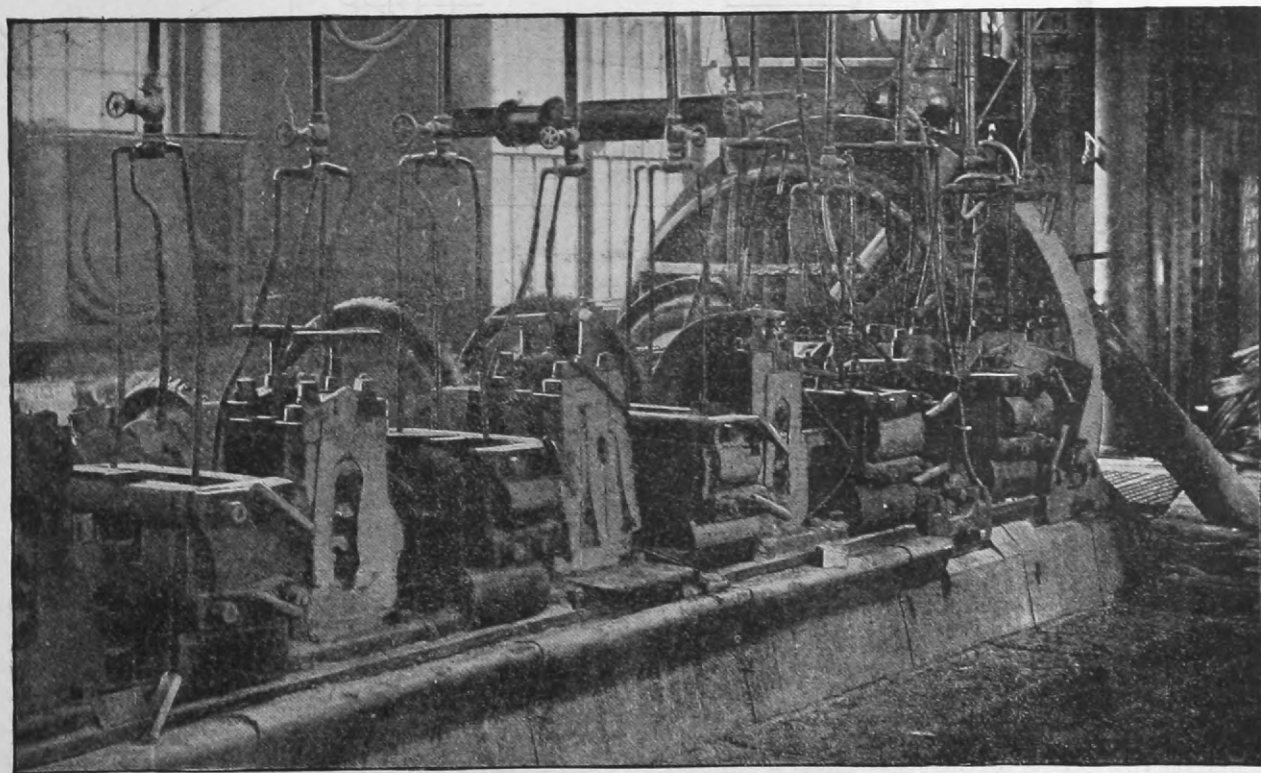


Fig. 9.—The Bedson Continuous Mill.

### ROD-ROLLING MILLS AND THEIR DEVELOPMENT IN AMERICA.

tudes without a parallel in the history of the iron and steel industry. Twice has the building been leveled to the ground by fire. Once its galvanizing department was burned out, and now,

Forest City Iron Company built the plant, which was then known as the Lake Shore mill. In 1873 it was burned down. After being rebuilt it passed into the possession of the Britton Iron

fifth year) rebuilt the works, and again had them in successful operation one year later. The engines and machinery were not totally destroyed by either fire, and the greater part still remains



on the same site (now increased tenfold in value), where it was placed when Cleveland was little more than a village on the banks of the Cuyahoga River. In the spring of 1890 Mr. Britton, who had by this time become one of the most prominent iron men west of the

was operated until the spring of this year, when a fire, originated among the cinders on the banks of the lake, spread underneath the mill, which had been built upon made ground, and did such damage that the roll trains began to settle. After giving the matter of cost

old mill will be is hard to determine without knowing the intentions of the owners, but it is safe to say that little will be left of what was placed there 40 years ago when a rolling mill is again in operation on this valuable site. Progressive mill managers may profit

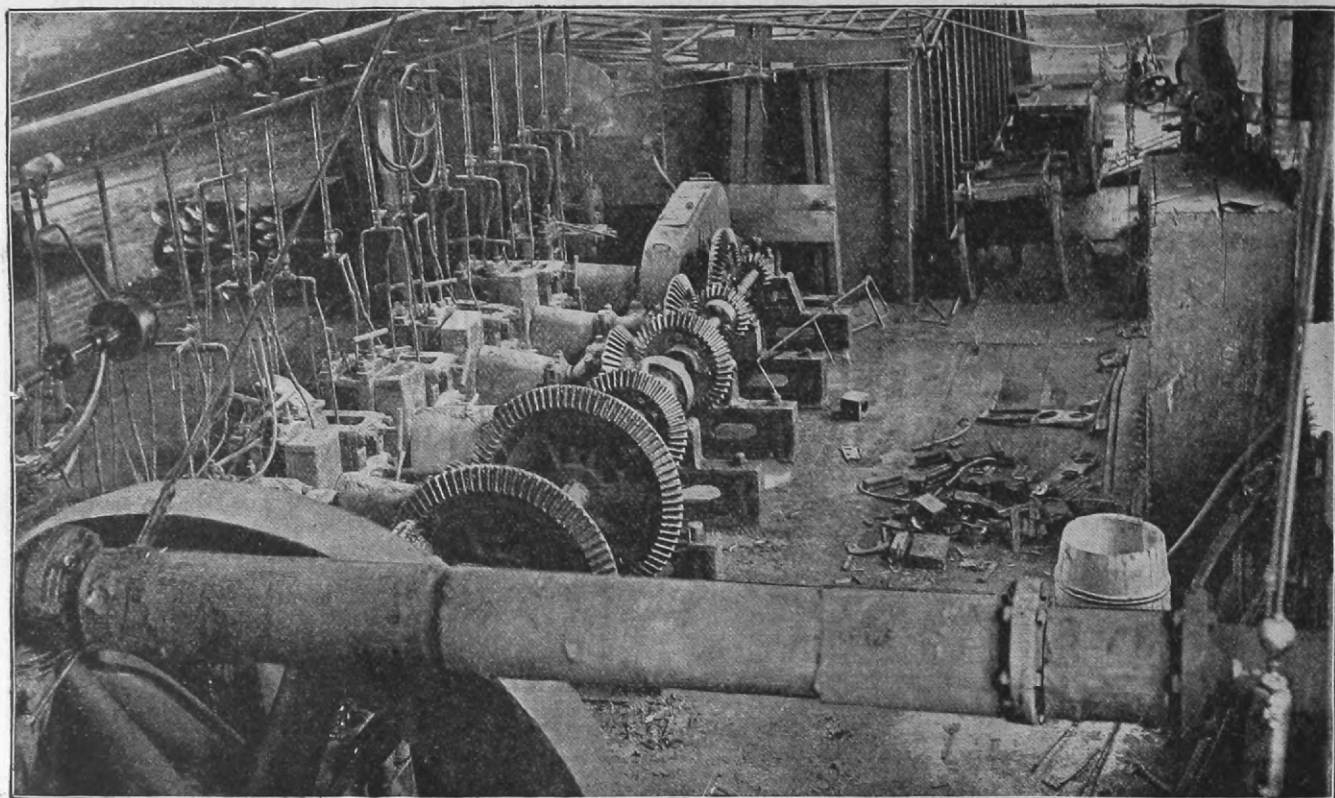


Fig. 10.—The Bedson Continuous Rod Mill.

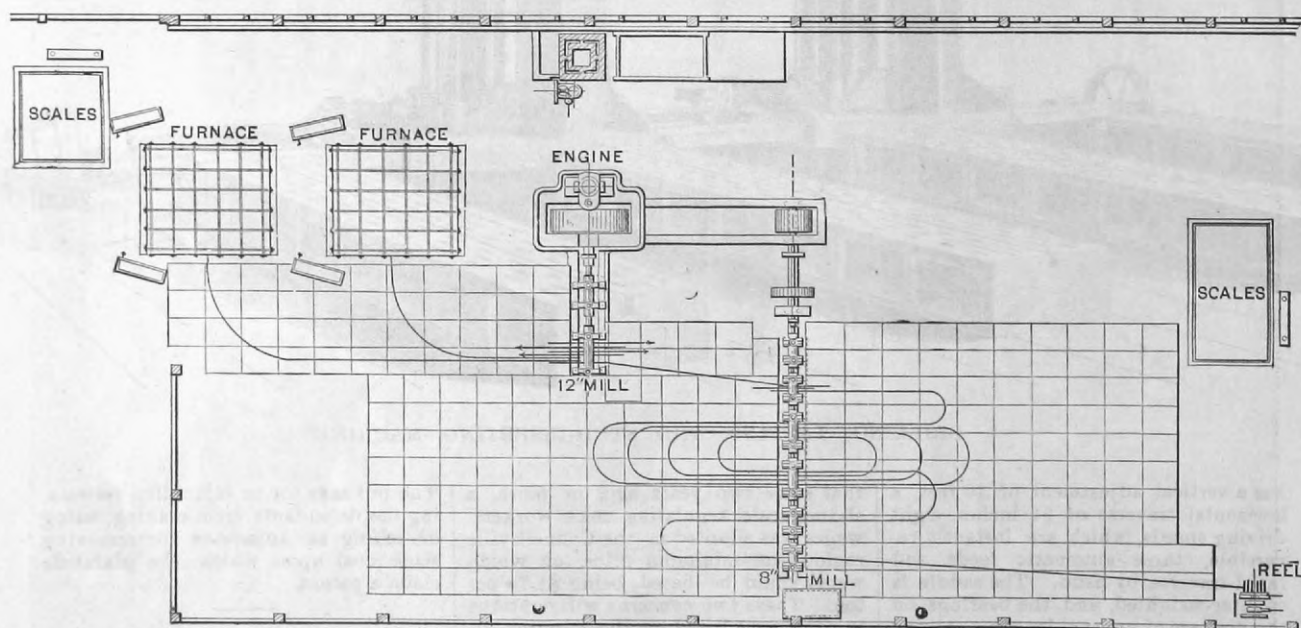


Fig. 11.—Belgian Rod Mill.

#### ROD-ROLLING MILLS AND THEIR DEVELOPMENT IN AMERICA.

Alleghenies, retired from the management of the mill, and built the new "Britton" mill a short distance from the old site. The parent concern passed into the control of Frank Rockefeller, L. H. Severance, S. A. Sague and others closely identified with the Standard Oil Company. Under the new management the plant

of repair and improvements due consideration the management decided to close down the plant and take no action until the state of business affairs throughout the country showed signs of improvement. Signals of distress were already hoisted and subsequent events have proved that the policy was a wise one. What the future of the

by the lesson taught in this brief history of the old "Britton" mill.

The Harvey Steel Company, who control the Harvey armor plate hardening process, have paid a cash dividend of 20 per cent. on their capital of \$500,000.



### Drilling, Tapping and Stud Inserting Machine

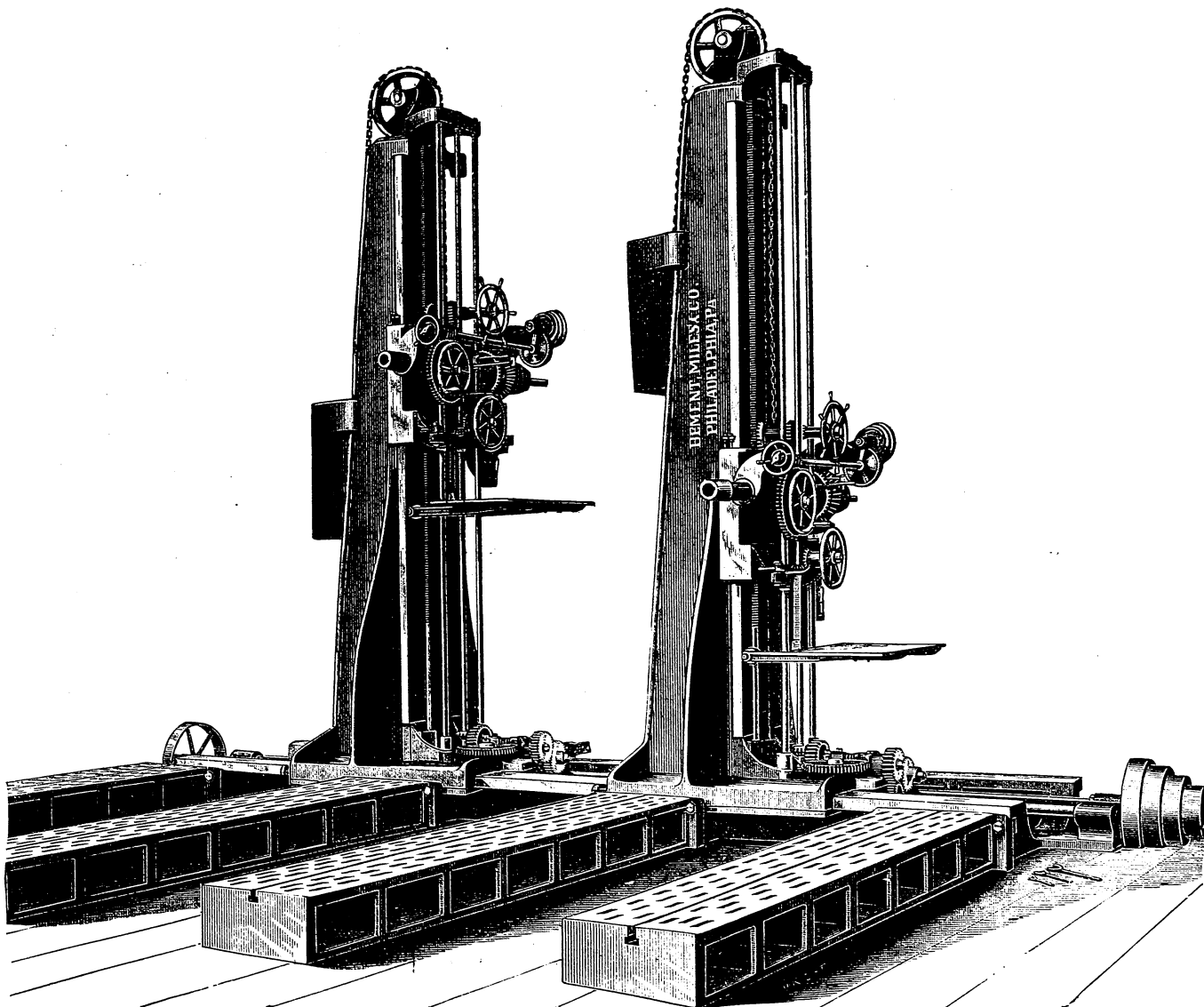
A drilling, tapping and stud inserting machine built by Bement, Miles & Co. of Philadelphia is constructed with one or two posts, as required, and with one bed plate or several, as shown in the cut. The usual length of the bed of the No. 8 machine is 15 feet, giving a horizontal movement of the post of 10 feet. The size of the four plates forming the work table is 12 feet by 2 feet. The spindle

trip will probably take place about the middle of next month, when it is expected that the vessel will make quite a knot an hour over the speed required by the contract.

Last week the H. C. Frick Coke Company and the McClure Coke Company, both of Pittsburgh, posted notices at their various works in the Connellsville region, notifying their employees that hereafter wages would be paid based upon \$1.75 per ton as the selling price of coke. It will be remembered

other places or for their native land. It is stated that there are many Hungarians in the Connellsville regions that have amassed enough wealth during their stay in the United States to make them independently rich in their native country.

In the United States Circuit Court at Pittsburgh last week a bill was filed by P. H. and F. M. Roots of Connorsville, Ind., against the Pennsylvania Coal Company and Dunmore Iron & Steel Company of Lackawanna County, Pa.



DRILLING, TAPPING AND STUD-INSERTING MACHINE.

has a vertical adjustment of 10 feet, a horizontal traverse of 24 inches, eight driving speeds, which are instantly reversible, three automatic feeds and rapid traverse by hand. The saddle is counter-weighted, and the bearings on the post are of unusual length. All the bearings are square locked, and taper shoes are provided for taking up wear. All the power motions and feeds, including the movement of the post on its bed and the saddle on the post, are effected by levers from the platform at tached to the saddle upon which the workman stands. The machine is accurately fitted and substantially built in all its parts, and is intended for heavy work.

The United States cruiser "Olympia" is nearing completion at the Union Iron Works, San Francisco. Her trial

that some two years ago, or more, a sliding scale regulating coke workers' wages was adopted in the Connellsville region, the minimum price, on which wages could be based, being \$1.75 per ton. These two concerns will continue to pay wages based on these figures, although Connellsville coke is now being freely offered at \$1.25 per ton. At many of the smaller works in the region heavy reductions in wages have been made, but the terms of the sliding scale are being rigidly observed by the two named concerns.

The closing down of a majority of the coke ovens in the Connellsville region for an indefinite period on account of the large falling off in demand for coke has resulted in many hundreds of Hungarians employed leaving the region for

The bill asks for an injunction restraining the defendants from making, using or selling an apparatus for removing slack coal upon which the plaintiffs claim a patent.

The American Wire Glass Mfg. Company, Tacony, Philadelphia, have had their large new factory running for nearly a month, and are now putting out some 3000 square feet of wire glass a day. The full capacity of the works will be 5000 square feet a day, which output will shortly be reached. Orders and inquiries for this new material are said to have reached the company from all parts of the world and they have received numerous expressions of approval from customers to whom they have already delivered consignments of wire glass.

## Welded Seams in Plates \*

BY WARREN E. HILL,

Vice-President Continental Iron Works,  
Brooklyn, N. Y., U. S. A.

The process of welding together plates of steel or iron to form vessels of various shapes, especially those of cylindrical form, to resist either tensile or collapsing strains, is only recently adopted, and generally accepted as productive of marked practical advantages. But few engineers have had opportunity to become conversant with the practical use of such welded and seamless vessels, or with their advantages over riveted structures, for retaining fluids or gases under very high pressures.

The value of shells made up of plates welded together for the boilers of naval and other marine vessels is sure to be more generally recognized and accepted in the near future; and as a number of stationary boilers having welded shells are now in successful operation, and a locomotive with the boiler shell, furnaces and combustion chamber welded, using a steam pressure of 185 pounds, is worked with the most satisfactory results on the Lehigh Valley road, it seems that it should be of interest to engineers and others to retrace the steps and experiences that led to this advancement in the art of welding iron and steel plates.

Plate welding was practiced more than 25 years ago by Thomas F. Rowland, president of the Continental Iron Works of Brooklyn, N. Y., who was the first in this country, to the writer's knowledge, to foresee the possibilities and advantages of the art of welding in this respect. At this time the facilities for properly heating plates were meager and inappropriate, yet by creditable skill forgings were produced that were a noticeable advance over previous attempts. One product may be mentioned, and which is now an exhibit at the Columbian Exposition in Chicago. This consists of a vessel fashioned after the form of a soda-water bottle, having an interior measurement of 17 inches diameter and 40 inches length, the thickness being  $\frac{1}{2}$  inch, the bottom hemispherical, and the neck drawn down to  $2\frac{1}{4}$  inches. Even at this later date this vessel is regarded as the embodiment and example of a high order of skill in the art of plate welding and forging.

It has been the practice until recently to make the weld in plates with a V-shaped or "glut" piece. That is, the edges of the plate to be welded were oppositely beveled, the plate was rolled to cylindrical form, and this cylinder placed seam down on a forge fire of coal or coke, a fire brick being laid inside the seam directly over the fire to retain or store the heat, while, meantime, the "glut" piece, consisting of a bar of round iron, was receiving a welding heat at a neighboring fire. When the cylinder edges and glut were properly heated, the cylinder was lifted by a chain encircling it and running over a sheave carried by a crane, and by porter bars was given a half-turn to bring the seam parts uppermost. It was then passed over a bar anvil, the glut was laid in the V formed by the adjacent edges of the plate, and hand hammers were briskly applied to consolidate the

parts, a weld of about five to six inches along the seam being completed with one heat. After one such welding, the glut bar was cut off close to the seam, and the operations of alternately heating and welding were repeated until the seam was finished.

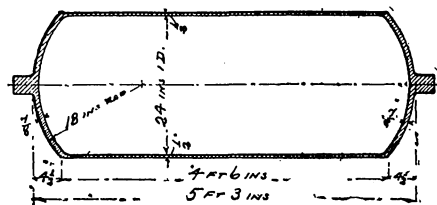
The Continental Iron Works first employed welded plates practically in the construction of the boiler furnaces of the United States ironclad monitor "Monadnock," in 1876. These furnaces were 36 inches diameter, and 8 feet 7 inches long and  $\frac{1}{2}$  inch thick, each furnace consisting of three cylinders, flanged at their ends, and joined together on the Adamson principle. These furnaces successfully stood the test then made under the supervision of United States engineer officers stationed at the Continental Iron Works; a section of the furnaces inclosed by a jacket being subjected to a collapsing hydrostatic pressure of 450 pounds to the square inch. The weld proved to be perfect, and it is to be regretted that the test was not carried to the point of collapse or destruction, in order that further data of value might have been obtained.

A demand then arose for reservoirs in which to store carbonic acid gas under great pressure. These reservoirs were for use in the "Lay" torpedoes, many of which were built for the Russian and other European governments, several being turned out in the year 1878.

These vessels were of plate iron,  $\frac{1}{2}$  inch thick and cylindrical in form, being 54 inches in length in the cylindrical part, 24 inches inside diameter, and having heads  $\frac{3}{4}$  inch thick, which were dished 4 inches. The seam along the body and the circumferential seams forming the junction between the body and the heads were made with a glut piece. The heads were of extra thickness, since they had to serve as an anvil while the gluts were welded in the corners. These vessels were subjected to hydrostatic test pressure of 1800 pounds to the square inch. A steel tape line encircling the cylinder during the test measured the circumferential enlargement, which reached  $1\frac{1}{2}$  inches; and, though the test strain exceeded the elastic limit of the iron, and the stretch remained permanent, yet under this great pressure the welds continued perfect and no weeping at the seams was detected. We were informed that carbonic acid gas was to be stored in these reservoirs at a pressure of 800 to 1000 pounds to the square inch, and was to be supplied to the propelling engines at a greatly reduced pressure by means of reducing valves.

were quickly obtained, were uniform, and there was an absence of ashes, clinker and dirt. More particularly was the advantage of heating jets which could be applied simultaneously on both sides of the plate by the use of two portable furnaces, gas and air being conveyed to their combustion-chambers through flexible tubes in volumes of  $2\frac{1}{2}$  of air to 1 of gas. The furnaces are supported so that they can be readily thrown in or out of action, and their gas connections are fitted with proper valves convenient to the welder or furnace man, who readily controls the mixing of the gases so as to produce the most effective heats. The cylinder or work to be welded is placed on a tracked carriage with the seam at the top, a fixed bar anvil is arranged in the upper part of the cylinder in line with the seam, and the furnaces in close proximity are located on opposite sides of the seam parts and adjacent to the anvil; thus the time of getting the heated parts over the anvil and under the hammers is reduced to a minimum.

The practice of welding with fuel gas soon made apparent the objections to interposing a piece between plates for the purpose, as had been thought necessary, for producing a reliable weld. The essential objections to the presence of a glut in a seam are, that there are two welds or junctions instead of one (the two edges of the plate being joined to the two sides of the glut) to resist the strains of the cylinder when under pressure, and the objectionable necessity of separate fires for the plate and glut bar. The question then arose, Why not dispense with the weld piece or glut, and scarf and join the edges of the plate as a smith would scarf and join bars before joining them by a weld? And so in a short time scarf-welding became the established practice at the Continental Iron Works, the edges of plates to be joined being hammer-scarfed or planed to a proper bevel while the plates are flat. In Europe it is common to dispense with such scarfing, either by planing or hammer work, mainly as an economy of cost of labor; and when rolling the plain plates to cylindrical form preparatory to welding, their adjacent edges are left in the position of an overlap, which overlapping parts are, when heated and subjected to the hammers, mashed one into the other. The defects of such practice are, that the corners of the plate edges that come in contact with the anvil and hammers immediately lose their heat, and thus an unsatisfactory weld results. The seam of



When steel came into general use, and to a great extent displaced iron because of its greater tensile strength and ductility, it was still the practice in welding the steel to employ a V-piece or glut of iron; in fact it was then considered impossible to otherwise produce a proper weld. In 1885 a water or hydrogen gas plant was erected at the Continental Iron Works, and the use of this gas fuel was a great stride in the advancement and improvement of the art of plate-welding. Heats by this gas

such a weld made in a pipe of any considerable thickness will, upon critical examination, be found to exhibit the result of these defects, and show that the skelp was not scarfed before welding. With a scarf-weld, however, the body of the plate is not cut into, and if desired the thickness at the weld can be in excess of that of the plate.

In scarfed plate welding, hand and steam hammers are employed, as well as direct-acting hydraulic machines, rollers, and combined roller and hydraulic-

\* Presented at the World's Engineering Congress before the Division of Marine and Naval Engineering and Naval Architecture.

power machines. With hammer work there is likelihood of imperfect distribution of work on the weld; one part of the seam may be unnecessarily worked, while possibly an adjacent place would not receive a sufficient number of blows, and blows may be landed where they exercise no useful effect. This uncertainty also is largely true of hydraulic work. The best plate-welding work known to the writer is done by a machine of the combined roller and hydraulic type, embodying an unyielding anvil roller which is on one side of the seam, and a movable roller which is applied to the other side, and which is pressed to its work by hydraulic power of unvarying pressure.

This machine consists of two vertically arranged stakes or levers strongly secured together at their base, one of which supports at its upper end the stationary inside anvil roll, the face of which is convexed to the circle of the cylinder to be worked; and this stake also serves as the guide of a cylinder-carrying table that is vertically operated by hydraulic power. The other or outer stake carries at its upper end, and opposite the anvil roll, a laterally working slide block, in which is mounted the outer or movable roll, which has its face concaved to the circle of the cylinder to be welded, and is in the axial plane of the anvil roller. The heating furnaces are mounted on top of the stakes just above the welding-rolls, the outer furnace being adjustable to and from the other, both being in the same working plane.

The cylinder to be welded is lifted over the inner stake and properly clamped at its lower end to the table, the seam parts being in the vertical line between the furnaces and welding rolls. The gas furnaces are now turned on to heat that portion of the seam located between them, and, utilizing an essential advantage in the use of gas furnaces, an intense jet is directed upon the scarfed edges to bring them to proper welding temperature, while a diffusive flame is applied to the parts adjacent to the edges in order that the heat may properly graduate to the cold parts, so as to prevent any injury to the structure of the metal, as would occur by a too distinct line between the heated edges and the cold parts. Having brought the scarfed edges to the desired temperature, the outer welding roll is moved under suitable pressure to contact with the seam or cylinder, which is forced against the anvil roll; the cylinder table is then reciprocated vertically and the heated parts passed between the rolls two or three times, and a weld completed of 6 to 8 inches in length. The welding roll is then released from contact, the cylinder moved so that the portion of the scarf or seam next the weld is brought between the furnaces for heating, and so on, until the seam is finished. With such apparatus a weld is produced that has been subjected in every part to an equally distributed pressure.

A great number of welded boilers of various sizes, known as "digesters," and used for reducing wood to pulp for the manufacture of paper, have been made at these works, and are now successfully operated. Many of them are 7 feet internal diameter and 30 feet over all in length. The limit of width and length in which steel plates can be made at the plate-rolling mills necessitates making these vessels from several pieces. In describing these boilers, the welds in the circumferential seams are known by the shop technically as "cross-welds." These boilers in the

cylindrical parts are made up of three courses, the plates being  $\frac{1}{4}$  inch thick. The heads are  $\frac{3}{4}$  inch thick, "bumped" in a hydraulic press to a depth of 15 inches, and are flanged 6 inches deep on the periphery. Before rolling the

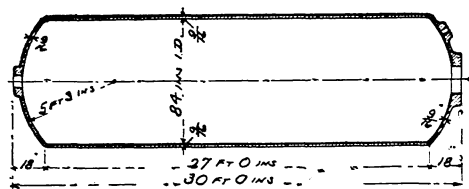
mitted to the action of these rolls for two or three minutes the corrugations in the cylinder are completely formed, and, by the law governing the flow of metals, the corrugations, notwithstanding the apparent stretching and upset-



plates to form the cylindrical portion of the digester, they are beveled in a planer, thus forming the scarfs. The heads when flanged are beveled on a table lathe or boring mill. After welding the cylinders in the vertical welding machine before described they are clamped together and the cross-weld made by hand. These digesters when in use at the paper mills are set vertically, and have heavy rings welded in the top head to form the hole through which the wood is passed to the interior of the boiler, and the lower heads also have rings welded in to form an outlet for the pulp after treatment. The operation of producing the pulp is carried on for about four hours, during which time the pressure maintained is 125 pounds to the inch. Of course, while blowing out the product and refilling the boiler with wood chips the temperature is greatly reduced. These repeated operations cause great strains on the vessels by the action of expansion and contraction,

ting of the metal, have an even thickness. After thus corrugating the plain cylinder the circumference of the outer corrugations is  $4\frac{1}{2}$  inches greater than was that of the plain cylinder, while the inner corrugations are of a circumference correspondingly less; in other words, the material has been stretched outwardly this distance and compressed or upset the same distance inwardly, making a total range of elongation and compression of  $9\frac{1}{2}$  inches. During such operation of corrugating, the weld is severely worked and tested—in fact, by such a test as a smith would put to the weld in a bar by bending it backward and forward to test its perfection. Although these furnaces are all, after completion, subjected to an internal hydrostatic pressure test of 250 pounds to the square inch, not 1 in 50 ever shows a pinhole.

Hundreds of welded shells have been furnished for the Morren or Climax boilers, and many for the Ward boilers,



which would soon cause a riveted boiler to leak at the rivets and calking. These boilers, after the completion of welding, are annealed in a proper annealing furnace, and afterward are subjected to a hydraulic pressure of 190 pounds to the square inch.

Probably no more severe test can be put to the joint or seam of a welded cylinder than that of corrugating the cylinder to produce a furnace to be used in a boiler. Thousands of these steel corrugated furnaces have been made at these works, and their use in naval and merchant vessels of our country has given entire satisfaction. To the knowledge of the writer, not over a half dozen have failed, and in these cases the failure was in "coming down" or collapsing by reason of a greasy deposit having lodged on their tops, which repelled the water from contact with the metal under great heat. This accident, however, would occur to any furnace under these conditions, even if the metal were several inches thick.

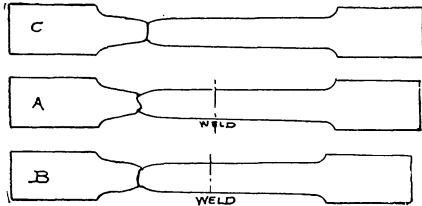
The process of making corrugated furnaces may be interesting. The plate from which a furnace is made is scarfed at its edges, then rolled and welded into a cylinder whose diameter is equal to the mean diameter of the furnace after corrugating. The welded cylinder is then put in a vertical gas furnace and submitted to an even heat, from which it is transferred to a vertical corrugating machine, the corrugating spools of the outer roll of which mesh with and are fed horizontally into those of the inner corrugating roll. After the cylinder has been sub-

and the Porcupine boilers built by the Hazelton Boiler Company of New York; the steam drums for the United States torpedo boat "Cushing," and numerous yachts, having Thornycroft boilers, built by the Herreshoffs of Bristol, R. I., have been furnished by these works, all proving perfectly tight and satisfactory.

The welded shell referred to as being in active operation on the Lehigh Valley road is on locomotive known as No. 444, is composed of steel plates  $\frac{1}{8}$  inch in thickness, and has an internal diameter of 60 inches. This boiler has a grate surface of 60 square feet, a heating surface of 1848 square feet, and develops in its general work 900 horse-power. This locomotive has been worked up to a development of 1810 horse-power for a period of three hours' duration. About 90 pounds of coal per square foot of grate surface is burnt hourly, the working steam pressure being 185 pounds. This boiler was tested under hydrostatic pressure to 250 pounds to the square inch.

A natural question is, Are welded structures of the kind described as strong at their seams or welds as elsewhere? We will give a single test example that can be taken as the type of many others that have been made, and that could be verified if there were need therefor. A plain headless cylinder was made up of two plate pieces cut from the same commercial plate, which were rolled to semi-cylindrical form and welded together cylindrically, one longitudinal seam being hand-welded and the other being welded

by the vertically-acting welding machine above described. Three test pieces of uniform size were then cut from this cylinder—one across the machine welded seam, one from across the hand-welded seam, and one from an unseamed part of the cylinder. These pieces, marked, respectively "A," "B" and "C," were sent to Fairbanks' Department of Tests and Experiments in New York City, with request that they be tested. The results showed that no piece broke at the weld, or, in other words, each piece broke across its unseamed part. The cut



above illustrates these test pieces, and the exact data derived from these tests can be ascertained by a study of the copy of the tabular report that was furnished.

Dimensions.	Orig. Inal.	Final. Inal.	Mark	A	B	C
			Test No.	9,507	9,508	9,509
			Shape, original	Boiler plate.		
			Shape, of test piece	(See cuts.)		
			Length, inches	7	7	7
			Width, inches	1.286	1.280	1.282
			Thickness, inches	0.493	0.523	0.538
			Area, square inches	0.634	0.669	0.690
			Length, inches	8.74	8.40	8.92
			Wid. h. inches	0.900	0.905	0.942
			Thickness, inches	0.289	0.359	0.338
			Area, square inches	0.260	0.325	0.318
			Per cent. elongation	24.85	20.00	29.42
			Per cent. reduction	58.99	53.50	53.91
Stress in pounds. Tension.			Elastic limit on specimen			
			Maximum on specimen	36,100	39,820	39,530
			Elastic limit per square inch			
			Maximum per square inch	56,940	56,970	57,300

It will be apparent to persons who give even the most superficial attention to the subject of the construction of vessels, for the holding of fluids or gaseous substances under what is generally considered excessive pressure, and also to the production of structures of numerous forms and for various uses, by the process of welding steel plates together, instead of the conservative method of uniting the same by rivets, that the development of this interest, even to the almost primitive state in which it now obtains (and which is only an earnest of what will be accomplished in the future), is the resultant of many years of experiment, thoughtful study, and great difficulties, and also the expenditure of large sums of money without fair prospects of a speedy return thereof. Nearly a score of years were consumed by the persons who, in this country, have steadily pressed the development of this welding industry, before anything like fair remuneration for their labors began to be received. Various difficulties other than mechanical difficulties had to be met and overcome, prominent among which was the prejudice entertained by engineers against welded joints, as compared with those formed by the well-known method of riveting and calking. Scarcely any one not familiar with the subject will be able to discern the practicability of making cylinders of considerable size by welding steel plates together for holding high pressures, because, as has been argued, no methods were known by which the in-

tegrity of welded seams could be assured, notwithstanding the fact that for a generation past almost every internally fired boiler has been provided with cylindrically constructed pipes, or tubes, having welded seams measuring in length from hundreds to thousands of feet, and no engineer questions the integrity of the welded seams of such productions. These pipes or tubes, it is true, were and are welded by machinery, but only in limited sizes, and the efforts of those who have made a constant study of and improvement in this art of welding have been simply to enlarge upon and extend this old method, which has unquestionably been accepted as a perfect but restricted method of producing such structures. For years the limit of the diameter of an iron lap-welded tube or flue was 12 inches; now the production of tubes of 24 inches diameter is a common operation. At the Continental Iron Works it is the common practice to weld up boilers and other vessels of 7 or 8 feet diameter, having a length of from 30 to 33 feet, which diameter and length is only limited by the restrictions of railroad transportation, by the size of the apparatus producing the welds, and by the oven in which the

even with metal of the same thickness as required for riveted work, the weight of butt-straps and rivets will be dispensed with.

### Mechanical Coaling Device for Steamers.

An invention which promises to fill a place of great usefulness in connection with the coaling of steam vessels has been invented by an Englishman, M. J. Paul, who recently exhibited his device in action in the Clyde Dock at Rotherhithe, England, in the presence of representatives of the admiralty, Lloyd's, shipping companies and others interested. The system of mechanical coaling invented by Mr. Paul combines in a coal barge a conveyor and an elevator formed in one. It is said to accomplish the work expeditiously, cheaply and in a manner involving little inconvenience, desiderata which have long been felt, more particularly in the case of passenger steamers coaling at intermediate stations, where time is wasted and inconvenience and discomfort from coal dust experienced on account of the prevailing arrangement of carrying coal into the vessel from the lighter by hand in bags or baskets. This primitive method is still used in the case of steamers coaling in open water, notwithstanding that the mechanism for loading coal into vessels alongside the wharf has become of so great efficiency both as to speed and economy.

The apparatus introduced by Mr. Paul is thus described in a recent issue of the *Engineer*. The hold of the barge is divided in the line of keel by two fore-and-aft bulkheads, about 2 feet 6 inches apart, forming a central well, with doors at the sides. The bottom of the hold has an inclination at each side toward the doors, so that when they are opened the coal drops through them into the central well, along the bottom of which a series of troughs, forming a conveyor, travel on an endless steel chain. Motion is imparted to the endless traveler through a driving drum geared direct to a horizontal single cylinder 4 horse-power engine in the stern of the barge. From this drum the conveyor, or chain of troughs, passes along the central well over another drum and thence up the incline formed by a derrick, the arrangement corresponding to the ladder in a dredger. While the troughs are passing round a third drum at the top, the coal is delivered into a covered-in shoot, which may be arranged to deliver at either side, or in front, as desired. Each link of the endless chain has attached to it a steel plate with the sides turned up, and every third plate is an angle, thus forming the continuous series of troughs between 3 and 4 feet long and 2½ feet wide, in which the coal is carried along. To prevent it falling back while the chain is ascending the incline of the derrick, the top of the angle forming the trough is slightly curved. The troughs are fitted with loose rollers which travel between guide rails. At the ordinary speed of the engine the chain traveled at the rate of about 50 troughs or buckets per minute, and transferred the barge load of about 120 tons to an ordinary barge in 75 minutes. This performance might have been exceeded if the four attendants had been familiar with their work of attending the bulkhead doors, which are operated by worm gear, and of assisting the coal into the troughs.

## Segregation and its Consequences in Ingots of Steel and Iron.\*

BY ALEXANDRE POURCEL, PARIS,  
FRANCE.

The phenomena of liquation in steel or iron ingots of all sizes, but naturally to greatest extent in the heaviest ingots, have been noticed ever since the commencement on a large scale of the Bessemer and open-hearth manufactures; but they have been studied with care during the last few years only. The English and the Americans were the first to publish the results of investigation upon phenomena of this class, to which they have given the name of segregation.

### Order of Segregation of the Principal Elements of Steel.

There is no absolute rule according to which the different metalloids and metals entering into the composition of industrial steels are liquated, but the average of a large number of operations has shown that the order of segregation is somewhat as follows: Carbon and phosphorus, sulphur, silicon and manganese. Copper liquates quickly when it is present in notable proportions. Homogeneity may be given to cupreous steels by adding a minute proportion of aluminum. It is equally difficult to obtain homogeneous masses of chrome or wolfram steel, but these alloys are beyond the province of the present paper. We may, however, mention as highly homogeneous the nickel-bearing steels, particularly those in which this metal is present in large proportion; the reason being, undoubtedly, that it accelerates solidification.

### At What Moment Does Segregation Take Place?

Segregation operates during the congelation of the cast piece, and exhibits itself in the parts which solidify last. Mr. Howe gives examples which prove the homogeneity of the metal in the ladle. In fact, as we have observed many times for soft steel, the metal first emerging from the ladle does not sensibly differ from that which leaves it last. In tapping directly from Martin furnaces into ingot molds there are often sensible variations between the metal of the first ingots and that of the last. H. H. Campbell† gives results of his tests upon samples taken during the first and the last cast, and for a dozen consecutive heats. Under tensile tests of cylindrical bolts 8 inches long the variations in resistance among these 24 samples reached 2960 pounds per square inch, the elongation varying from 21½ to 25 per cent. The variation in carbon did not exceed 0.045. Finally, as Mr. Howe concludes, even for carbon and silicon one cannot attribute the segregation observed in hard or soft steel ingots to an imperfect mixture of the final additions.

Moreover, while segregation is specially pronounced in an ingot in its central portion and around the space of the piping, differences in chemical composition bearing principally upon the proportions of carbon and phosphorus in samples taken from different points of a horizontal section,‡ can also be demon-

strated. It appears, then, that homogeneity is a quality almost impossible to realize in a block of steel.

### Consequences of Segregation.

The mother metal contained in the apparatus where it was formed, whether the Bessemer converter or the open-hearth furnace, is practically homogeneous. In the ladle it can be obtained perfectly homogeneous. But once solidified, in the form of the ingot or casting, the block of metal presents portions softer and less impregnated with foreign elements than the mother metal, from which, on the contrary, other parts differ entirely and do not even recall it.

In *Stahl und Eisen* of August, 1891, analyses are reported which were made upon test pieces taken from different parts of a Bessemer steel roll of 7 tons, cast at La Louviere. Its truncated conical form, reposing upon the larger base, caused the later solidification of the lower portion, the mass having been cast from the bottom. The mother-metal had the following composition:

C.	Si.	S.	P.	Mn.
0.240	0.336	0.074	0.089	0.970

The sample taken from the upper trunnion, which solidified first, gave by analysis:

C.	Si.	Mn.
0.215	0.338	0.910

That is to say, less carbon, but the same quantities of manganese and of silicon, the small differences in which may be attributed to errors of analysis.

The metal of the lower trunnion was harder than the mother metal. It contained:

C.	Si.	Mn.
0.314	0.280	0.980

As for the metal last solidified, which formed the walls of the cavity of the piping, its composition no longer resembled that of the mother metal, as the following figures show:

C.	Si.	S.	P.	Mn.
0.680	0.326	0.325	0.318	1.490

On the interior of this recess, or pocket of the piping, there was formed a sort of cake, 50 mm. thick, with a smooth surface, the chemical composition of which was still further removed from that of the mother metal, being

C.	Si.	S.	P.	Mn.
1.274	0.410	0.418	0.753	1.080

This is one of the most curious examples which could have been given of the phenomena of liquation in a metal comparatively soft and pure.

In blocks of smaller weight and limited dimensions, subjected to the influence of solidification as rapid as casting within thick walls will permit, liquation may still be observed very distinctly. One may judge from the following analyses made from an ingot of Martin steel, weighing about 450 kg. (992 pounds), and having a height of 1.10 (3.6 feet), and a section of 260 x 260 mm. (10.24 inches square).

#### 1. Upper section:

	C.	S.	P.	Mn.
Border.....	0.330	0.040	0.033	0.420
Center.....	0.530	0.077	0.057	0.430

#### 2. Lower section:

	C.	S.	P.	Mn.
Border.....	0.280	0.029	0.016	0.390
Center.....	0.290	0.030	0.038	0.390

#### 3. Middle section:

	C.	S.	P.	Mn.
Border.....	0.320	0.025	0.025	0.400
Center.....	0.320	0.048	0.048	0.400

In the portions in which the mother-metal has solidified almost instantly in

contact with the mold, there is preserved a practically homogeneous composition; carbon, for example, varying only from 0.280 to 0.330. And one may also consider the block as sufficiently homogeneous in the lower half of its mass.

Segregation is less marked in ingots of extra soft metal cast in cast-iron molds of considerable thickness. It is, however, still important, and explains the difference often shown by the results of tests on pieces taken from different portions of a plate. Two samples, taken from the sound part of a flat ingot, one on the outside and the other in the center, 20 cm. (7.9 inches) from the upper edge, gave:

	C.	S.	P.	Mn.
Center.....	0.14	0.053	0.072	0.576
Exterior.....	0.11	0.036	0.027	0.610

Manganese is the element most uniformly disseminated in hard or soft steel.

Herbert Eccles, at the meeting of the Iron and Steel Institute held in London in 1888,\* reported some interesting experiments made upon bars cut from plates of soft steel, with the view of investigating the cause of defects which they presented. A bar showing silky fracture had tensile strength of 26 tons per square inch and 25 per cent. elongation in 10 inches. Subjected for several weeks to the action of dilute chloride acid, it was attacked with tolerable regularity without showing any special corrosion upon the medium section of fracture. Another bar taken from the same cast gave, under tensile test, a fracture with brilliant points, and the tensile strength was only 23½ tons, with an elongation of 17 per cent. Subjected to the dilute acid, the granular part of the fracture was rapidly attacked, and after a certain time the sample appeared as if composed of two layers separated by an empty space.

Analysis gave different results for the central granular part and the silky part which covered it.

	C.	S.	P.	Mn.
Granular part....	0.160	0.073	0.112	0.570
Silky part.....	0.115	0.030	0.038	0.576

Another bar of silky fracture, which had given 26 tons per square inch of tensile strength, with 31 per cent. of elongation in 10 inches, was but slightly more readily affected on the inside than on the outside by the dilute acid. However, analysis revealed some difference between the metal of the exterior and that of the central portion.

	C.	S.	P.	Mn.
Central portion....	0.135	0.072	0.051	0.518
Exterior portion....	0.115	0.041	0.044	0.518

It happens sometimes that plates of ingot iron split along the edges. The texture is laminated. Such plates are the most defective. A sample several square inches in size, taken from the shearing of such a sheet and submitted to the action of acidulated water separated into two layers, the part between being almost wholly eaten away. The following are the analyses of the central and exterior portions:

	C.	S.	P.	Mn.
Central portion....	0.24	0.155	0.127	0.614
Exterior portion....	0.15	0.054	0.060	0.648

The analyses made upon plates of the famous boilers of the Livadia give considerable variations for samples taken from the same sheet, as the following percentages show:

Carbon = 0.095 and 0.200; phosphorus = 0.039 and 0.095; silicon =

\* *Journal Iron and Steel Institute*, 1888, No. 1, p. 70.

\* Presented at the World's Engineering Congress, Chicago, before the American Institute of Mining Engineers.

† *Trans.*, xiv., 359.

‡ Colonel Maitland, *Proceedings of the Institution of Civil Engineers*, London, vol. lxxxiv., 1887.



0.036 and 0.177; manganese = 0.331 and 0.371.

On the whole, it seems impossible to deliver from the phenomena of segregation, cast steel, hard or soft, in large or in small mass. Even in tool-steel melted in the crucible and cast in small ingots of from 30 to 40 kg. (66 to 88 pounds), it is rare to find a bar from 2 to 3 m. (6.5 to 9.8 feet) long having perfect homogeneity.

Microscopic examination reveals differences between two samples taken near each other from the same hammered or rolled piece. We have thus to do with an inevitable evil, the effects of which, however, we may ameliorate in large part by localizing it.

#### Conclusions.

The arrangement inaugurated at Terre - Noire, in 1870, has been universally adopted to diminish the most pronounced effects of segregation in obtaining the largest steel ingots for plates and for heavy artillery. Success has not been obtained for products of such importance without many failures, and even to-day we are far from being content with the result accomplished, especially for armor plates. Recourse has been had to hardening, and on good grounds; but hardening cannot render uniform the resistance to shock of a block which has not homogeneous composition. We know the metal we must not use, but do we know the metal the chemical composition of which responds exactly to the requirements?

In all cases the metal which forms the final armor plate differs from the mother metal prepared in the furnace, and the problem thus set us, "What is the mother metal which ought to give a final product of certain composition?" is evidently not easy to solve so long as the solution depends upon many variables. One and the same mother metal may furnish cast pieces of different composition.

For cannon of large caliber, if we reject, in addition to the part cast in sand and called the *masselotte* (sinking head), one-third of the upper part of the ingot, we can obtain a tube practically homogeneous in composition, because the central part is naturally removed by the boring of the tube. With extra soft steels, destined for ship, or boiler plates, the solution for practically perfect homogeneity lies in the obtaining of a metal more closely deserving its name of extra soft metal. We must recognize the error which has been committed in large constructive industries, whether private or governmental, in requiring of a metal called extra soft, and slightly or not at all sensible to annealing, tensile strength amounting to 42 or 48 kg. per square mm. of section (68,770 pounds per square inch).

It is certainly right to require for boiler plate a metal practically unaffected by hardening. In that case it is by elongation and by striction ("necking")—in which all the pure iron products are deficient—that we should define the mechanical properties of the metal, leaving tensile strength aside.\*

\* The manganese steels have no striction; neither have those which contain a high proportion of nickel. I refer to steels respectively carrying more than 10 per cent. of manganese and 20 to 25 per cent. of nickel. The cement or non-hardening carbon exists only in feeble proportion in these alloys, in which the iron, by a simple quenching in oil, appears to be preserved almost wholly in condition  $\beta$ . An alloy of 25 per cent. of nickel with 0.80 of carbon,

We can sincerely declare that in a long industrial career, the experience of which has a certain practical value (since we inaugurated in 1867 at Terre-Noire the manufacture of extra-soft steel with ferromanganese containing 80 per cent. of manganese) we have never been able to realize or to see others realize the desideratum of a homogeneous plate which successfully endured the hardening test with the tensile strength of 42 kg. (59,636 pounds per square inch) heretofore required for boiler metal. The lengthwise sample, cut from the bottom of the plate and satisfying a rigorous quenching test, rarely gave a maximum of 40 kg. (56,892 pounds). The lengthwise sample from the top of the plate was mediocre, and often absolutely bad, under the hardening test. And as to crosswise samples, while the bottom one would sometimes bend double, with a metal giving more than 40 kg. tensile strength, the top one was always defective.

We can even cite an instance (though an exceptional one) in which a boiler plate 22 mm. thick (0.87 inches), made from the lower part of the ingot, showed an extreme lack of homogeneity:

	C.	S.	P.	Mn.
Average sample.....	0.200	0.03	0.050	0.150
Samples from the middle portion, thickness being reduced by planing to 10 mm. (0.39 inches).....	0.380	0.080	0.120	0.140

Another example, furnished by a plate 30 mm. (1.18 inches) thick, exhibits, on the contrary, a satisfactory homogeneity in the foot of the plate, while the head presents a very heterogeneous composition. Lengthwise and crosswise samples from the head gave by analysis:

	C.	S.	P.	Mn.
Exterior, lengthwise.....	0.24	0.025	0.050	0.160
Exterior, crosswise.....	0.24	0.017	0.052	0.150
Interior, lengthwise.....	0.32	0.061	0.100	0.170
Interior, crosswise.....	0.40	0.070	0.088	0.140

The corresponding samples from the bottom of the plate give practically uniform results:

	C.	S.	P.	Mn.
Exterior, lengthwise.....	0.250	0.028	0.060	0.120
Exterior, crosswise.....	0.250	0.030	0.070	0.110
Interior, lengthwise.....	0.250	0.022	0.060	0.120
Interior, crosswise.....	0.260	0.031	0.052	0.120

Under tensile test, for a length of 100 mm. (3.9 inches), the strength and elongation of these specimens corresponded with their chemical composition.

Specimens from above:

	Lengthwise.
Tensile strength, kilos per square mm.....	47 and 46
Tensile strength, pounds per square inch.....	66,848 and 65,426
Elongation, per cent.....	27 and 32
	Crosswise.
Tensile strength, kilos per square mm.....	45 and 47.7
Tensile strength, pounds per square inch.....	64,003 and 67,844
Elongation, per cent.....	13 and 21.5

Specimens from below:

	Lengthwise.
Tensile strength, kilos per square mm.....	41.7 and 42
Tensile strength, pounds per square inch.....	59,310 and 59,636

after quenching in oil, gave, under tensile test, 50 kg. per meter (113,760 pounds per square inch) tensile strength, and 60 per cent. elongation in 10 cm. (3.9 inches).

	Crosswise.
Tensile strength, kilos per square mm.....	42 and 41.5
Tensile strength, pounds per square inch.....	33 and 33.5

In spite of the comparative purity of the metal, the pieces taken for hardening from the bottom of the plate did not sufficiently meet the required conditions.

To what distance from the foot of the plate does this state of homogeneity extend? Can we be assured of securing it with practical certainty by rejecting one-third or one half of the upper part of the ingot? This necessarily depends upon the rapidity with which the metal solidifies in the mold. Flat ingot molds with thick walls have long been used to obtain a rapid solidification, which, however, must always be a function of the temperature of casting and the transverse section of the ingot, varying according to its weight.

#### Aluminum Steel.

In our opinion the injurious consequences of segregation must be suppressed by reducing, as far as possible, the elements subject to liquation.

Upon the basic or neutral open-hearth, and starting with an initial bath of approximately pure materials, it is easy to obtain a metal containing not more than 0.1 per cent. of carbon; 0.03 phosphorus and traces of sulphur, with 0.10 of manganese. By adding 0.1 per cent. of aluminum the metal can be cast quietly and without altering its composition. Consequently, if from an ingot so cast and destined for boiler plate one-fourth to one-third of the upper part (in which the carbon and phosphorus may reach respectively 0.12 and 0.03, for example) be cut off, the remainder will be a block of approximately perfect homogeneity.

Operating in this way we have obtained in a large establishment in the northeast of England \* ingots from 2 to 3 tons, 18 inches square, which, being first treated by the hydraulic press and subsequently rolled into billets, were utilized almost without waste in the manufacture of wire for telegraphic cables.

We think that the specifications prepared by the late engineer, Mr. Cornut, for the *Association des propriétaires d'appareils à vapeur* of the north of France, express the conditions most suitable for boiler-plate.

The elongation lengthwise of the annealed plate ought never to be less than 30 per cent. in 20 cm. (7.89 inches); as regards tensile strength, 40 kg. per square mm. (56,892 per square inch) as a maximum seems to us too high.

For ship plates, whatever may be the importance of having a much stronger metal in order to diminish thickness and weight, it is our opinion that too much is sacrificed to this consideration to the neglect of (1) the more easy and certain manipulation of a more malleable metal, and (2) the action of sea water, which may be a fifth or a fourth more rapid upon a metal with 45 kg. (64,003 pounds) tensile strength than upon a softer and more homogeneous metal with only 38 kilos (54,047 pounds) tensile strength.

In the construction of bridges, our preference for the use of an extra-soft metal runs counter to the general desire of having for this purpose a metal of high elastic limit. But, nevertheless, it has not been wished hitherto to secure

\* The Port Clarence Steel Works, owned by my friend, Sir Lowthian Bell, Bart. The figures refer to 1890.



this precious mechanical quality in bridge metal by increasing the hardness beyond a certain very moderate limit. Why not use a new alloy? Chrome steel has already been tested; and when to a pure metal, like boiler metal, 0.2 to 0.4 per cent. of chromium has been added, homogeneous blocks have been obtained, and the limit of elasticity has been raised notably—up to two-thirds of the breaking strain—without sensibly altering the elongation.

In the direction of alloys there may be found various advantageous solutions of the problems involved in the manufacture of metals destined for civil constructions.

As a final conclusion of this summary survey, we would call attention to the fact that tensile tests and mechanical tests in general may determine *a priori* the intrinsic qualities of a mass of fluid metal, but not those of a solid metallic block, whether before or after work has been done upon it.

### The Limitation of Engine Speed.\*

BY CHAS. T. PORTER, MONTCLAIR, N. J.

The practical limitation to high rotative speed in stationary reciprocating steam engines is not found in the danger of heating, or of excessive wear. The causes of both these, it is now well understood, are to be looked for in defects of design or construction, commonly of both, as they generally go together, and where these do not exist to a degree which is of practical moment, a bar to the proper employment of higher rotative speed appears long before a tendency to heat or wear is to be observed. Correct designs are now generally followed in both the fixed and the moving parts of steam engines and a high degree of truth is readily attained in their construction, so that it has come to be a simple matter to make engines which can be run at very high speed, quite free from either of these difficulties.

Contrary to the general belief, no objection to very rapid rotation is afforded by the development of centrifugal force in the fly wheel or band wheel. This the following exposition will make clear.

The centrifugal force of 1 pound making one revolution per minute, in a circle of 1 foot radius, is 0.000341 pound. This force varies directly as the radius in feet,  $R$ , and as the square of the revolutions per minute,  $r$ . Hence the expression  $Rr^2 \cdot 0.000341$  gives the centrifugal force in terms of the weight,  $W$ . This is a simple and convenient formula.

A handy formula is desirable for the centrifugal force developed in each 1 square inch of section of the rim of a fly wheel. This is obtained as follows: In a cast-iron wheel of 1 foot radius, measured to the center of gyration of the rim, the value of  $W$  for each 1 square inch of rim section is 19.6. This number, multiplied into 0.000341, gives 0.0066836 as the centrifugal force, in decimals of a pound, of this ring at one revolution per minute. As both the centrifugal force and the weight vary directly as the radius, we have the expression

$$(Rr)^2 \times 0.0066836$$

for the centrifugal force developed in

each 1 square inch of cross section of the rim of any cast-iron wheel. For example, this centrifugal force in a wheel 5 feet in diameter making 300 revolutions per minute is 3759.5 pounds.

$$(2.5 \times 300)^2 \times 0.0066836 = 3759.5.$$

This is the sum of the centrifugal stresses, exerted equally in all directions, in the plane of revolution. What is the measure of the tendency of these forces to burst the wheel?

*Answer.*—One-fourth part of these forces, 940 pounds, is resisted by the tensile strength of two opposite sections of the rim. This strength, for good American iron, may be taken at 20,000 pounds per square inch, aggregating 40,000 pounds in the two sections, giving a factor of safety of 40.4. So this wheel may be run at double speed, 600 revolutions per minute, with a factor of safety of 10.

The wheels of high-speed engines have generally solid rims, and no case of their bursting has, I believe, ever been known. Disasters from this cause have been confined to engines not designed to be run at high speed, and have sometimes occurred when the speed was only slightly accelerated above the normal rate. In these cases the wheels have been built in segments, with surprising disregard of necessary strength in the flanges and bolts by which the segments were held together. The American Society of Mechanical Engineers will do a good thing if it shall adopt 10 as the factor of safety in tensile strength, to be recommended by it for all mechanical work, and shall also recommend that in segmental wheels the joints be made, if anything, a little stronger than the section of rim. In applying the formula given above, it will be safe to take as the value of  $R$  one-half the outside diameter of the wheel. This being greater than the diameter measured on the center of gyration, the computed centrifugal force will be greater than that really exerted.

Again, an objection to very high speed is not found in a tendency to knock on the centers. In a properly designed and constructed engine, in which the valves are correctly set, and which is run by steam, high speed tends to silent running. Noise from bad design or bad work, from insufficient lead given to the valves and from water in the cylinder is excluded from consideration.

It is admitted with pride that the bad consequences of these defects are aggravated by high speed. This revelation of them has wrought an entire change in engine construction, not yet completed, and even makers of slower speed engines have largely profited by it. But it is obvious that there is now no excuse for their existence. The only legitimate cause of knock on the centers is loose boxes, and knock from this cause is softened as the speed is increased, and at extremely high speed will disappear entirely, owing to the force of the steam at these points being absorbed in overcoming the inertia of the reciprocating parts.

Again, vibration is not an objection to very high speed, because it is an easy matter so to design and construct an engine and balance the running parts that it shall be free from vibration at any speed whatever.

Again, very high speed is not objectionable, *per se*. If an engine runs in silence, completely free from vibration, without any tendency to warm, and without wear of any running part, its very speed renders it an object of

especial admiration, even to those to whom such speed is new. Whenever extremely high speed in a steam engine has caused any other feeling in the beholder than that of admiration, it has always been the case that it has been attended with something annoying, a noise or a jar, or some uncomfortable action, which ought not to have existed.

All this being true, there still remain two considerations of a controlling nature which require that the rotative speed of the engines shall be kept within moderate limits.

The first of these is that engines ought not to be run as fast as they can be. It must on reflection be obvious to every one that an engine should be capable of running, and that too with entire satisfaction, so far as its motion is concerned, a great deal faster than it is run. This is the solid ground of security and confidence. It means peace and comfort, and helps to make men sleep well o' nights. It means long life to both engine and builder. I do not know anything to which the ancient maxim, *in medio tutissimus ibis*, is more directly applicable. Observe the force of the superlative, *tutissimus*, considered as a positive statement, "in the middle course you shall go most safely." That is just what we want in mechanics, in all our progress, to go most safely.

The second objection to the employment of extremely high speed is a very serious one indeed. It is the large amount of waste room in the port which is required for proper steam distribution. In the important respect of economy of steam the high-speed engine has thus far proved a failure. Large gain was looked for from high speed, because the loss by condensation on a given surface would be divided into a greater weight of steam, but this expectation has not been realized. Far from it. The performance of this class of engines shows, instead, a positive, and in some cases a large, loss in economy. For this unsatisfactory result we have to lay the blame chiefly on the excessive amount of waste room. It has been already pointed out by Harris Tabor that the ordinary method of expressing the amount of waste room in the percentage added by it to the total piston displacement is a misleading one. It should be expressed as the percentage which it adds to the length of steam admission, and then every one would see what a serious thing it is. For example, if the steam is cut off at one-fifth of the stroke, 8 per cent. added by the waste room to the total displacement means 40 per cent. added to the volume of steam admitted. Under these circumstances, it is obviously the duty and for the interest of builders of high-speed engines to adopt every expedient for reducing the amount of waste room that can be done consistently with the proper admission and discharge of the steam. For this, the first requisites are moderate piston speed and longer stroke.

Engines of 4, 5 and 6 feet stroke may properly be run at from 700 to 800 feet of piston travel per minute, but for ordinary sizes I would recommend and urge that 600 feet per minute be taken as the limit of piston travel under all circumstances. This would give from 300 revolutions per minute with 12 inches stroke to 100 revolutions per minute with 36 inches stroke, with which purchasers ought to be satisfied. I would ask builders, in their own interest, to resist the temptation to get the utmost out of a given engine, and to set their faces like a flint against the

\* Presented at the World's Engineering Congress at Chicago before the American Society of Mechanical Engineers.

demand for short-stroke engines, which shall occupy but little room and from which the required power can be got by speeding up beyond the limit here proposed.

But I am met with the objection that in this class of engines large waste room is a necessity to prevent breakdown from water in the cylinder—that of the two alternatives of waste of steam in this way and broken cylinder-heads and pistons purchasers prefer the former. I confess that I am thoroughly disgusted at the engineering which puts purchasers of engines in such a dilemma as this. Getting rid of water in the cylinder seems to be the prerequisite to any attempt to reduce the amount of waste room. Then, by all means, let it be the first object of builders of high-speed engines to get rid of all possibility of water in the cylinder, in an amount capable of doing any harm.

## THE WEEK.

The New York *World*, in what it claims to be an authentic list compiled from official sources, places the present number of trades-union men now unemployed in this city at 36,177, or 27.6 of the whole.

The "Black Country" in England bids fair to make its popular name inapt within a short time. A London journal noted lately the great change which is coming over that district in the growing use of gas and oil engines for motive power in place of the coal-fed furnaces and steam engines which have hitherto contributed to maintain a heavy pall of smoke over the country. This is now in a fair way to be obviated, and a complete transformation of the face of the landscape will in time be presented to travelers, who have always dreaded the railway journey through the "Black Country."

A new feature developed by the present money stringency is the collection by New York banks of drafts on banks in other cities and towns through the medium of the express companies. The cost of this transaction is materially below the rate charged for interior exchange.

A Fostoria, Ohio, dispatch says that a large number of farmers in that section are feeding their wheat to hogs rather than sell it at the low prices now ruling.

On August 1 the new cruiser "New York" went into commission at Cramp's shipyard, and the 8-inch guns were hoisted on board. The barbettes and turrets will require another month to complete.

According to the British Consul General at Havana, the Cuban cigar trade is feeling the effects of the McKinley tariff to a serious extent. The exports of cigars to the United States, which reached 102,000,000 in 1889, dwindled last year to 54,500,000. The Cuban press is urging the Madrid Government to aid the industry by reducing the heavy taxation under which it labors.

Boycotting one railway by others is proving a very unpopular method of enforcing requirements with many of the roads. Advices from Chicago state that the Wabash has given notice that the one declared against the Mobile & Ohio by the Western Passenger Association will only be observed by it so far as the lines within the territory of the association are concerned. On all

other branches business arrangements with the Mobile & Ohio will be maintained as formerly.

The pinch of hard times is being felt even by the leading railroads. President Roberts of the Pennsylvania issued last week an order for reducing the hours of labor in the mechanical department of the railroad from six days a week of 10 hours per day to five days of nine hours each. The order affects all the shops of the Pennsylvania Railroad system, including the leased and controlled lines. This action has been taken with a view to reducing expenses.

Since the adoption of electric projectors for steamers the number of vessels passing through the Suez Canal has considerably increased, as navigation can now be carried on day and night uninterruptedly.

The *Marquette Mining Journal* says: "Despite the great outlook for the Mesaba mines, according to Mesaba reports, they are experiencing the rockiest kind of hard times on the range this summer."

The mistake of having all their eggs in one basket is being felt by the city government of Milwaukee just now. All the city money, amounting to over \$1,600,000, is tied up by the failure of the Mitchell bank, in which it was deposited.

The *Ottawa Canada Gazette* contains a notice of an application to Parliament next session to incorporate a company to construct a ship canal from some point on Lake St. Clair to a point on Lake Erie, between Point Pelee and Rondeau harbor.

One of the most singular exceptions to the rule of unsatisfactory business conditions this summer, observes the *Cleveland Leader*, is the great increase in traffic on the Erie Canal and the corresponding improvement in the condition of the boatmen. Nearly twice as much grain has gone to the seaboard by the canal route as was shipped that way in the corresponding part of last year, and freights have been by no means remarkably low. This shows how valuable the canal still is as a safeguard against high rates on the railways between the lakes and the sea, for, if the water route had been closed this summer, grain freights from Buffalo to New York would surely have been a heavy burden to producers of very cheap cereals.

The Behring Sea arbitrators appear to find some difficulty in coming to a decision. It was expected that the matter would have been settled last week, but latest advices state that another fortnight will probably be required for the consideration.

Judge Lacombe of the United States Circuit Court of New York, in the case of an alleged contract laborer who was sent back to Bremen by the Commissioner of Immigration, but for whose detention a writ of *habeas corpus* had meanwhile been obtained, decided that immigrants sent back to Europe are within the jurisdiction of the commissioner until landed on the other side. The man will therefore be brought back at the expense of the Government in order that the case may be tried in the United States Courts.

Canada's fishery yield for 1892 is shown by statistics just prepared to have been of the value of \$18,941,171, a decrease of \$36,907 as compared with the previous year.

Railroad trains are besieged and farmers on the roads are heavily burdened by the troops of destitute miners marching East from Colorado. Many of the men have been provided with work on Kansas farms.

Real estate in Brooklyn shows an assessed valuation for the current year of \$486,497,186, or an increase of nearly \$19,500,000 over the valuation of last year.

The new Forestry Commission in New Hampshire is doing vigorous work in educating the farmers and lumbermen in regard to the extent and value of their forests and the best methods of treating them. It is believed that the New Hampshire forests are worth more for lumbering purposes than all the farms in the State are worth for agricultural purposes.

The *Financial Record* gives the following comparison of the approximate amount of gold and silver used annually in the industrial arts in the principal countries of the world:

Country.	Gold.	Silver.
Austria-Hungary....	\$1,960,428	\$1,843,586
Belgium.....	684,970	396,822
France.....	7,872,620	4,260,540
Germany.....	11,969,280	5,872,600
Great Britain.....	6,280,150	3,564,918
Italy.....	1,186,270	425,640
Netherlands.....	296,842	628,280
Russia.....	5,670,000	3,875,890
Sweden.....	370,979	111,280
Switzerland.....	8,796,284	1,422,789
United States.....	16,784,196	7,398,964

\$63,472,019 \$30,842,327

Gold exports from Cape Colony, South Africa, during May amounted in value to \$2,110,875, as against \$1,564,800 in May, 1892.

One of the largest contracts ever given out by the Post Office was awarded to a Vermont paper mill last week. It calls for 11,000 tons of postal cards, or 600,000,000 in number, to be manufactured during the next four years.

The civil service examinations which were held last week in Philadelphia to ascertain the fitness of applicants for positions under the National Government had the largest attendance ever held there, the candidates numbering over 1,200, or more than double the number that presented themselves four years ago. Of these, 1,019 were applicants for positions in the Post Office department.

Latest official reports announce the existence of 50 derelict vessels floating in the Atlantic Ocean that are regarded as dangerous to navigation.

Central America has felt the effects of the silver situation to a disastrous extent. In Costa Rica a financial panic exists which has involved in ruin many of the leading houses in that State.

The Secretary of the New York Chamber of Commerce has sent out 11,162 letters to banks and commercial associations in all parts of the country, urging them to get their Congressmen to vote for the repeal of the Sherman law.

New York city has \$16,000,000 invested in school sites and buildings. This is considerably more than the annual expenditure on education of Italy and Spain combined.

The ship canal across the Isthmus of Corinth was formally opened by the King of Greece on August 6. Its construction has occupied eleven years, although it is not quite four miles in length.

# The Iron Age

New York, Thursday, August 10, 1893.

DAVID WILLIAMS, - - PUBLISHER AND PROPRIETOR.  
CHAS. KIRCHHOFF, - - EDITOR.  
GEO. W. COPE, - - ASSOCIATE EDITOR, CHICAGO.  
RICHARD R. WILLIAMS, - - HARDWARE EDITOR.  
JOHN S. KING, - - BUSINESS MANAGER.

## The Engineering Congress.

Much to the surprise of many good friends of the movement, the engineering congress held in Chicago last week was a gratifying success. It had been feared that there were so many counter attractions in that city at the time that it would be impossible to get more than a corporal's guard at the sessions. But this was an erroneous judgment of the staying qualities of the members of the several engineering societies. Perhaps, also, due consideration had not been given to the important foreign attendance, which was a feature of the congress. At all events, the combination of interested native members and intensely interested foreign visitors was sufficiently great numerically to make the attendance on each division of this remarkable congress noteworthy.

Reviewing the programme, it will be seen how noteworthy the occasion was. There were seven divisions represented in the congress—civil engineering; mechanical engineering, mining engineering, metallurgical engineering, engineering education, military engineering and marine and naval engineering. Each division held a daily session for five days, occupying the entire morning, and on Saturday a joint final session was held to make an appropriate and graceful conclusion to the work of the week. A whole week was thus occupied in conducting the deliberations of the congress, and it is not too much to say that interest was sustained unflinchingly from the beginning to the very end. All the great nations of the world and many of the smaller countries were represented by engineers of eminence who were earnest in their praises of the valuable opportunities they had enjoyed for acquiring further information on important subjects connected with the practice of their profession. In the annals of the engineering societies of this country and in the notebooks of the foreign engineers the Chicago engineering congress of 1893 will be put down as by far the greatest event that has yet occurred in the history of technical societies.

Professor Reuleaux of Germany paid a high tribute to American workmen in a speech last week before the Engineering Congress at Chicago. Said he: "I observe that your workmen work to the thousandth of an inch. Our workmen are just beginning to do so." Most Americans, we believe, have been

under the impression that German workmen had attained greater precision than mechanics in this country. This impression may be due to the special thoroughness and mechanical skill shown in other trades than that of machinists, particularly in house-building trades. The good professor may be correct with regard to machinists, as our workmen in that line certainly do remarkably exact work, calling for instruments of precision which are often wonderfully delicate in their adjustment.

## Retrenchment Among Railroads.

The depression in business is seriously affecting railroads. At Chicago last week the Chicago, Milwaukee & St. Paul and Chicago & Eastern Illinois railroads gave notice that the salaries of all their officers and employees of general and local offices will be reduced 10 per cent. This action is rendered necessary by the continued decrease in the earnings of the roads. Last year was one of the best years in the history of the St. Paul road; but there has been a heavy falling off the past few months, and, in the language of the president of the company, "there is now no business in sight." The suspension of manufacturing, which is so general throughout the country, is at the root of the depression in railroad traffic. Ore, coal, lumber, wool and other leading commodities extensively handled on great systems like the St. Paul are now moving in such small quantities that the effect is felt in the treasurer's office and retrenchment is the word.

The indications are that a number of other roads will soon follow the example set by these two roads and reduce salaries. There is, however, a difference of opinion among managers, some contending that for the present expenses can be cut down by discharging officials and employees not absolutely necessary for the operation of the road, thus leaving at old figures the salaries of those retained. One road has, in pursuance of this policy, dispensed with the services of a number of high-priced assistants to officials, who are thus obliged to pay more attention to details than heretofore. This is very probably a good field in which to begin to enforce economy. There are undoubtedly in all large railroad offices positions that are to a great extent sinecures, the incumbents of which are well paid, while subordinates really do the work. A salary list should, in fairness to those who earn their stipend, be purged before it is shorn.

Thus far trainmen, shop hands and track employees have not been included in the scheme for reducing wages and retrenching expenses, but if earnings continue to fall off they will not escape unscathed. Their brother workmen in manufacturing establishments are either idle or getting greatly reduced pay, and railroad hands cannot hope to escape the con-

sequences of the precipitation of hard times. In view of the undoubted hostility of the men to any reduction in wages, and the chances of serious labor troubles on that account, it is, however, a matter which railroad managers would prefer not to handle. It would not be surprising, therefore, if concerted action should be taken by a number of important railroads whenever a general reduction of wages becomes imperative. A revival in the business of manufacturing will, of course, change this dismal prospect entirely, and it is to be hoped that the time of relief is at hand.

## Notes in the Machinery Trade.

A few weeks since a certain machinery manufacturing concern was running full handed and night and day. Since then the night shift has been taken off and 80 men have been discharged. This move was considered expedient even in the face of the fact that the orders in hand and those almost sure to be obtained were sufficient to keep the plant running with its full complement of men for some time to come.

The explanation is not far to seek. In the particular industry alluded to the payments are made largely in notes extending over long and short periods, a percentage of the total cost being in cash upon delivery. By this method the manufacturer is, in a certain sense, solely responsible for the payment of the notes he indorses, and the bank discounting those notes is not presumed to be familiar with the financial standing of the makers. This means that the indorser—in this case the manufacturer—must, in order to obtain the cash represented by the notes, practically lock up his resources to the value of the notes he has discounted. In case the notes are protested the bank holds him responsible, and he in turn looks to the drawer of the note for final settlement. This plan has been found to work to advantage in ordinarily prosperous times, and to be comparatively safe.

But with the money market in its present condition, this manufacturer refused, and, we think, wisely, to attempt to carry on his establishment by means of notes. It is doubtful if he could have negotiated all the notes he required, and if he had gone to the end of his credit it would not take the discounting of many of the notes he had indorsed to send him to the wall. Those considerations governed him, and he chose to do a smaller business on a safer foundation.

In the selling of machinery in general notes play but a small part in the transactions, unless the amount involved is large. Small transactions are made on a cash basis. Sometimes, as in the case of special machinery such as is occasionally required by the Government and large plants, the final payment is withheld until the machine has been set up and proved by actual oper-

ation that it is in all respects according to the specifications. Standard, or regular line machines, are sold with the tacit understanding that if a defect develops in working which could not be foreseen by the builder he is bound to make it good. The testing of these machines by work has no influence on the methods of payment.

### The "Evening Post" and the Somerton Tin Plate Works.

It is a pity that reputable journals should, for party ends, resort to methods which, to say the least, must be characterized as disingenuous. Statements have recently appeared in partisan newspapers in regard to the condition and prospects of certain manufacturing industries which appear to have been deliberately designed to produce a misleading and injurious impression on the minds of those who are not well acquainted with the real state of the matter. These questionable tactics have of late been very freely used by the opponents of the American tin-plate industry, who have let slip no opportunity of disseminating and enlarging upon any items of intelligence, or even mere rumors, in connection with domestic tin-plate works, which may be calculated to discredit the industry with the general public. The strenuous and honest efforts which have been made by home manufacturers to build it up have been not only ignored but in many cases willfully misrepresented and doubts thrown on their integrity. Stoppages of works for the usual summer repairs, or on account of the heat, or temporary suspension of production caused by the general dullness of trade, have been greedily seized upon by certain papers and magnified into failures and embarrassments.

Some journals have gone a step further, in deliberately fabricating intelligence of this sort and publishing it, along with wholly imaginary interviews with leading business men. Quite recently the New York *Evening Post*—a bitter opponent of the American tin-plate workers—printed a long article purporting to show the evil effect of the McKinley tariff upon the tin-box trade of Brooklyn. The condition and prospects of three of the principal concerns manufacturing tin boxes in that city were given—ostensibly from information afforded by members of those firms—as being quite seriously depressed and gloomy, owing to the tax on tin plates. One of these concerns was the well-known firm of Somers Brothers, in regard to which the following remarks were made:

"Somers Brothers attempted the manufacture of sheet tin last year, but gave it up two weeks ago. One of the members of the firm of Somers Brothers said that the depression in trade had a good deal to do with the reduced number of hands, but that the McKinley tariff bill did the greatest harm. Continuing, he said:

"If Congress at its extra session would repeal the tax on tin our trade would be greatly benefited. If we could manufacture tin in this country at a profit, it would be all well and good, but as we are compelled to purchase all our tin and black plate in Wales, the tariff is steadily injuring us." (The italics are ours.)

Somers Bros., as is well known in the trade, have manufactured large quantities of tin plate regularly since their tinning works were started last fall. Every one of the plates used by them for tinning was rolled at their own mills; so that the statement that they had been purchasing them in Wales was absurd on the face of it, and would sufficiently prove the unreliability of the whole effusion to those acquainted with the trade. But it was thought by some that the firm might possibly have discontinued the manufacture of tin plates for other reasons, and an interview was sought with J. L. Somers, one of the partners, with the result of discovering that the whole thing from beginning to end was a "fake." No reporter of the paper in question had ever approached any member of the firm, and the quoted words were not spoken by any one connected with the works. In fact, they express views diametrically opposed to those held by the firm. As for the statement that the making of the plates by them had been a failure, and was therefore discontinued, it is so far false that the works have been running most successfully up to a short time ago, when they were closed down temporarily for the usual annual overhaul, and also because of the general dullness of trade in all its branches, rendering a short rest from production desirable, and especially so during the heated term. So far from relinquishing the manufacture of tin plate, the Somerton Tin Plate Works will be started full again on September 1. The false and unauthorized statements made so positively by the New York *Evening Post* have meanwhile been copied far and wide, and Messrs. Somers are harassed by inquiries from all parts of the country in regard to them. This is but one instance of the unscrupulous methods used by certain of the press to belittle the domestic tin-plate industry, but it is one of the most bare-faced, and therefore worthy of notoriety. To a less strong concern than Messrs. Somers such unfounded reports might have proved most disastrous, and no doubt similar misstatements have already done much harm to struggling concerns.

It is but fair to say that since the foregoing was written a statement has appeared in the *Evening Post* of August 8 couched in the following terms: "In an article published in these columns on July 31 describing the effect in the tin-box trade of the present business depression a member of the firm of Somers Brothers of Brooklyn was quoted as blaming the tariff for the present condition. Since then the Messrs. Somers have been out of town and could not be communicated with

concerning the statement. To-day Mr. Somers informed the *Evening Post* that he had been misrepresented; that his well-known views in favor of the tin duty had not been changed, and that he was now, strongly as ever, an advocate of maintaining it.

"It is but fair to say that the statement here repudiated was obtained by a reporter for the *Evening Post* by telephone from a gentleman who in response to the call said he was qualified to speak as he did for the firm. His words were those published."

The explanation of the method by which the intelligence so authoritatively published was obtained is hardly an exculpation. Nor is any correction given to the statement that Somers Bros. had found the manufacture of tin plates a losing enterprise and had relinquished it. So that the foregoing remarks lose none of their point by the *Evening Post's* lame retraction.

While the financial difficulties which have overtaken Robert H. Coleman of Lebanon, Pa., resulting in judgments against him amounting in the aggregate to \$2,604,000, have been a matter of surprise to the public in general, those who have closely followed his course for some time past have feared that financial disaster was only a matter of time. Mr. Coleman has been a conspicuous figure in the iron trade of this country, and particularly in Lebanon Valley, where he operated the Colebrook, Cornwall Anthracite and Lochiel furnaces, and possessed a large interest in the famous Cornwall ore deposits, the history of which is familiar to every one identified with the iron trade. It is stated that his indebtedness to the Pennsylvania Trust Company is \$3,062,500, while Archibald Rogers of New York has entered five judgments for \$212,500, \$39,000, \$25,000, \$10,000 and \$20,000. It is further stated as a fact not hitherto known that Mr. Coleman confessed judgment to the Pennsylvania Trust Company of Reading for \$1,500,000 in 1891, but the matter was not made public at that time. The judgments in favor of Mr. Rogers are said to be for money borrowed to invest in Florida railroads and other enterprises, and it is believed that the unfortunate speculation made by Mr. Coleman in building, unaided, the Jacksonville, Tampa and Key West Railroad did much to bring about his present embarrassment. There are also said to be suits pending against him in the United States Circuit Courts for about \$400,000. The Coleman estate is involved in litigation, and these troubles, together with the business depression and the low price of iron ore, are believed to have hastened the present state of affairs. It is stated that the proceedings are of an amicable character and are largely designed to protect the interest of the Coleman estate. Subsequently Mr. Coleman and his wife made an assignment of their property to Archibald Rogers of Hyde Park, N. Y., and Henry T. Kendall of Reading. The former is a brother-in-law of Mr. Coleman and the latter his attorney.

The Linden Steel Company of Pittsburgh announce, under date of the 8th, that they have been compelled to suspend payments. A meeting of the creditors will be held in a few days.



## An Enormous Decline in Pig Production.

Since June 1 67,000 Tons Per Week.

The American iron trade has never witnessed so sudden and astounding a decline in the production of pig iron as that which has taken place in the past two months. It is a movement, too, the force of which has not yet spent itself. It may be stated, generally speaking, that the normal production of pig iron is 9,000,000 gross tons per annum, or, say, 175,000 tons per week. On June 1 it was very close to that figure. On July 1 it had dropped to 153,762 tons, and on the 1st of the current month it has fallen to 107,042 tons, as shown in detail below. Probably, at this writing, it is close to 100,000 tons. This means that we are making only at the rate of 5,200,000 tons per annum. The increase in the stocks indicated by our returns, which do not include reports from the large producers, who are known to carry large quantities, should not be interpreted as directly proving that consumption is even less than the output.

On August 1 the active furnace plant, grouped according to fuel used, possessed the following weekly capacity:

Fuel.		
Anthracite.....	51	23,572
Coke.....	84	77,907
Charcoal.....	34	5,563
Total, August 1.....	169	107,042
Total July 1.....	220	153,762
Decrease.....	-69	-46,720

The weekly product of all the furnaces on August 1 compared as follows with that of preceding periods:

	Furnaces in blast.	Capacity per week. Gross tons.
August 1, 1893.....	169	107,042
July 1.....	220	153,762
June 1.....	244	174,029
May 1.....	261	181,551
April 1.....	255	178,858
March 1.....	255	176,978
February 1.....	251	171,201
January 1.....	246	173,068
December 1, 1892.....	246	176,271
November 1.....	244	171,082
October 1.....	236	153,027
September 1.....	238	151,643
August 1.....	238	155,138
July 1.....	254	169,151
June 1.....	269	173,674
May 1.....	268	177,886
April 1.....	230	185,462
March 1.....	305	193,902
February 1.....	308	187,383
January 1.....	305	183,082
December 1, 1891.....	298	188,135

The status of the charcoal furnaces was as follows:

Charcoal Furnaces, August 1.

Location of furnaces.	Total number of stacks.	Number in blast.	Capacity per week.	Number out of blast.	Capacity per week.
New England.....	13	6	450	7	510
New York.....	5	2	19	3	390
Pennsylvania.....	13	1	45	12	870
Maryland.....	6	2	118	4	300
Virginia.....	13	0	0	13	827
Ohio.....	9	5	282	4	189
Kentucky.....	3	1	81	2	200
Tennessee.....	8	5	384	3	189
Georgia.....	3	1	233	2	320
Alabama.....	13	5	1,366	8	1,890
Michigan.....	20	3	1,119	17	5,111
Missouri.....	2	1	390	1	293
Wisconsin.....	4	1	737	3	1,127
Texas.....	4	1	143	3	560
Washington.....	1	0	0	1	100
Oregon.....	1	0	0	1	225
Totals.....	118	84	5,563	84	13,101

As compared with previous months, the record of active charcoal furnaces stands as follows:

	Furnaces in blast.	Capacity per week.
August 1, 1893.....	34	5,563
July 1.....	35	7,422
June 1.....	34	8,034
May 1.....	38	8,595
April 1.....	38	8,729
March 1.....	36	8,623
February 1.....	37	8,934
January 1.....	38	8,865
December 1, 1892.....	41	9,509
November 1.....	42	9,540
October 1.....	39	9,174
September 1.....	42	9,657
August 1.....	41	8,331
July 1.....	42	9,364
June 1.....	48	11,613
May 1.....	40	10,100
April 1.....	44	10,859
March 1.....	50	11,734
February 1.....	49	10,991
January 1.....	48	11,164
December 1, 1891.....	52	11,033

During July there were blown out Gaylord and Western in Michigan and Fond du Lac and National in Wisconsin, all large producers. Chatham in New York and Catocin in Maryland resumed, the latter on cold-blast iron.

The position of the coke furnaces was as follows:

Coke Furnaces, August 1.

Location of furnaces.	Total number of stacks.	Number in blast.	Capacity per week.	Number out of blast.	Capacity per week.
New York.....	7	1	1,235	6	3,947
Pennsylvania:					
Pittsburgh district.....	25	16	24,705	9	15,001
Spiegel.....	1	0	0	1	1,000
Shenango Val. and Juniata and Conemaugh Valley.....	16	7	6,792	9	7,604
Spiegel.....	16	5	3,196	11	5,421
Youghiogheny Valley.....	1	1	536	0	0
Miscellaneous.....	3	0	0	3	2,215
Maryland.....	4	2	1,300	2	1,200
West Virginia.....	5	0	0	5	5,536
Wheeling District.....	1	0	0	1	250
Ohio:					
Mahoning Val. Central and Northern.....	8	3	3,846	5	4,157
Hocking Val. Hanging Rock.....	15	5	5,796	10	8,446
Indiana.....	11	5	4,413	6	3,975
Illinois.....	14	1	661	13	3,080
Minnesota.....	14	2	324	12	2,848
Wisconsin.....	19	0	0	19	412
Missouri.....	20	3	7,100	16	20,025
Colorado.....	1	0	0	1	639
The South:					
Virginia.....	1	1	1,144	4	2,896
Kentucky.....	3	0	0	3	3,572
Alabama.....	3	1	650	2	1,150
Tennessee.....	22	9	5,284	13	6,390
Georgia.....	7	2	675	5	2,568
N. Carolina.....	36	12	7,756	26	13,790
Totals.....	14	6	3,631	8	4,165
	1	1	716	0	600
	1	1	97	0	0
Totals.....	261	84	77,907	177	125,397

As compared with previous months, the active coke furnaces make the following showing:

	Furnaces in blast.	Capacity per week.
August 1, 1893.....	84	77,907
July 1.....	122	117,072
June 1.....	140	132,079
May 1.....	146	139,788
April 1.....	145	135,488
March 1.....	145	133,579
February 1.....	140	129,396
January 1.....	138	131,731
December 1, 1892.....	136	133,160
November 1.....	133	130,673
October 1.....	128	118,895
September 1.....	128	114,538
August 1.....	131	117,984
July 1.....	140	127,433
June 1.....	145	128,852
May 1.....	147	132,313
April 1.....	152	138,116
March 1.....	163	143,490
February 1.....	167	138,268
January 1.....	163	138,611
December 1, 1891.....	162	142,747

Among the coke furnaces which have banked or blown out are two Troy, in New York, three Edgar Thomson, two Lucy, one Isabella and two Mononga-

hela in the Pittsburgh district, Etna and Raney & Berger in the Shenango Valley, one Cambria, Bellefonte, among the furnaces grouped under miscellaneous in Pennsylvania; three Maryland Steel Company, Franklin, Dover, one Seneca, Belfont, Huron, Lawrence, two Wells-ton, Bessie, Bellaire, Hubbard and Mary in Ohio, Iroquois and two South Chicago in Illinois, the last furnace in Missouri, one Colorado, and two Sloss and two Tennessee in Alabama. There were blown in during July Clinton in Pittsburgh and Pulaski in Virginia. Since the 1st some additional stacks have stopped and others are preparing for a suspension of operations.

The status of the anthracite furnaces was as follows on the 1st of this month:

Anthracite Furnaces, August 1.

Location of furnaces.	Total number of stacks.	Number in blast.	Capacity per week.	Number out of blast.	Capacity per week.
New York.....	18	1	589	17	6,094
New Jersey.....	11	2	920	9	3,841
Spiegel.....	3	2	147	1	118
Pennsylvania:					
Lehigh Valley.....	44	19	6,801	25	9,544
Spiegel.....	1	1	62	0	0
Schuylkill Valley.....	27	13	7,280	14	4,975
U. Susquehanna Valley.....	14	4	1,869	10	3,112
L. Susquehanna Valley.....	17	4	2,802	13	4,493
Lebanon Valley.....	15	5	3,102	10	4,271
Totals.....	150	61	23,572	99	36,448

For a number of months past our records of active anthracite furnaces show the following:

	Furnaces in blast.	Capacity per week.
August 1, 1893.....	51	23,572
July 1.....	63	29,268
June 1.....	70	33,916
May 1.....	67	33,168
April 1.....	72	34,641
March 1.....	74	34,773
February 1.....	74	32,871
January 1.....	70	32,772
December 1, 1892.....	69	33,602
November 1.....	69	30,869
October 1.....	69	29,958
September 1.....	66	27,453
August 1.....	60	28,821
July 1.....	72	31,754
June 1.....	76	33,209
May 1.....	81	35,473
April 1.....	84	36,487
March 1.....	89	38,678
February 1.....	92	38,124
January 1.....	94	38,807
December 1, 1891.....	85	34,905

Among the furnaces which have stopped operations are Crown Point in New York, Glendon in the Lehigh Valley, two Lackawanna and Marshall in the Upper Susquehanna Valley, and two Chickies and two Pennsylvania Steel Company on the Lower Susquehanna. Paxton and two Lackawanna have shut down since the opening of the month, and other suspensions of operations are talked about.

### Stocks.

The position of stocks, sold and unsold, as reported to us August 1, was as follows, the same furnaces being represented as in former months:

Stocks:	Aug. 1.	May 1.	June 1.	July 1.
Tons.	Tons.	Tons.	Tons.	Tons.
Anthracite pig.....	111,463	133,209	117,595	114,955
Coke pig.....	395,390	324,864	321,987	324,138
Charcoal pig.....	181,838	202,272	202,608	193,629

Totals..... 698,696 660,345 642,190 632,722

It will be seen that a heavy increase has taken place in coke iron stocks, amounting to about 71,000 tons. The accumulation has taken place principally in Allegheny County, and Shenango Valley, Pa., and in the Mahoning Valley and Central and Northern Ohio. The status of anthracite and charcoal

iron stocks has not materially changed during the past month. The stocks are exclusive of the accumulations at the large steel works, which are known to be very heavy.

Part of the plant of the United States Iron & Tin Plate Mfg. Company at Demmler, Pa., manufacturers of tin andterne plates, and iron and steel sheets, was put in operation on Monday, August 7. Operations were resumed in order that the firm could finish up some old orders and get out some new ones for which their customers are pressing them. As to whether the plant will continue in operation right along has not as yet been determined. Tin plates are all that are being turned out, and were it not that the firm are in receipt of orders from old customers who will not use any other brand, their plant would be idle. In view of the great depression now existing in business circles, it is certainly very complimentary to the above firm to be able to state that they have been compelled to start up their works in order to meet the demands of their customers for tin plates, many of whom will not use any other brand.

The Gatling machine gun has been still further improved by the adoption of an improved feed. With this new feed the motion is positive, and there is no failure in any part of the movement, while the cost has been reduced from \$2.50 for the old feed to 2 cents for the new device. Another advantage is that a much larger amount of ammunition can be carried with the gun than by the old way. The gun can be fed by the new arrangement with the greatest rapidity. With it it has been fired 3120 times in a minute, and when turned by a small electric motor attached to the breech it can be fired 5000 times a minute. This improved feed was developed and applied to the gun used in the United States Government test in the shops of the Dwight Slate Machine Company of Hartford, Conn. The patents are in the name of two of the employees of these shops, and will be assigned to the Gatling Company. The Dwight Slate Machine Company are now engaged in adapting an electric motor to operate the feed, the electrical part of which is made by the Eddy Electric Company.

N. L. Cort & Co., importers of tin, tin plate and other metals, at 245 Water street, New York, have made an assignment to Frederic G. Dow, lawyer, of 192 Broadway, giving seven preferences for money loaned, aggregating \$34,425. The liabilities are stated to be about \$350,000, while the amount of the assets is not yet known. The latter consist of merchandise, bills receivable, outstanding accounts and property. The failure is due to depreciation in the price of metals, failure of customers to carry out their contracts with the firm, and the general financial stringency. The firm have been prominent in the metal trade for a good many years.

Lewis Bros. & Co. of Montreal have removed their warehouses and office to 30 St. Sulpice street.

Best, Fox & Co. of Pittsburgh have renewed their agreement with Taws & Hartman of Philadelphia for the manufacture and sale of their patent tuyeres, tuyere breast, &c.

## The Mining Engineers.

Contrary to the experience of the World's Congresses, held earlier in the exposition, the Engineering Congress has been a pronounced success, not only in the high quality of the papers presented, but in the numbers in attendance and the valuable discussions invoked.

After a short joint session of the associated engineering societies devoted to addresses of welcome the sections proceeded with the special work assigned to them. Prof. S. B. Christy, professor of metallurgy in the University of California, opened the mining and metallurgical section, giving a summary of an elaborate paper on "Mining Schools," in which he compared the increase in mineral products with the number of graduates of mining schools and with the mining population. From the paper and its discussion it was shown that neither the miners nor the mining engineers, as well as the number of the latter can be estimated, has kept pace with either general population or with the mineral products. This latter condition would seem probable if the influence of mining schools in the past decade has been propitious—i. e., the average efficiency of each engineer should have increased, as shown by an increased product per engineer, which seems to be the case. In regard to the lack of a proportional increase of engineers in this country with the increase of population, the reason seems evident that it is a period of plenty in American mining, and that the demand for engineers will increase when the mining problems become as complex as in the older mines of Europe.

The paper of Dr. Clement Le Neve Foster of Llandudno, Wales, was a plea for international uniformity in publishing mining statistics. It developed discussion which showed a general desire for greater consistency in statistical work, and ended with a suggestion that Dr. Foster prepare a pamphlet for the Institute of Mining Engineers, in which the mining statistics of all nations will be correlated as far as possible.

The remainder of Monday's session was devoted to a summary of Prof. F. Posepny's paper on the "Genesis of Ore Deposits." This, together with a kindred paper by Prof. S. F. Emmons on "The Geological Distribution of the Useful Metals in the United States," furnished the principal themes of discussion at the subsequent sessions of the mining section. While much of this discussion took the form of small contributions of details relative to special local observations, the aggregate amount of information furnished was large and valuable.

The afternoon of Monday was devoted to an excursion to the exposition. This was designed for the mechanical engineers, but was finally extended to everybody. The weather was fine, although a high wind prevented the party from going by the whaleback steamer to the exposition and thence in launches to the "Two Mile" Crib. The multiple speed sidewalk, the Krupp Building, the Worthington pump exhibit and the power plant for the elevated electric railway system were visited, and the visitors were also entertained at the exhibits of the General Electric Company in the Electricity Building, and at night were given a fine view of the electric fountains from the electric launches.

Among those who attended the meetings were Dr. Henry M. Howe, president of the American Institute of Mining Engineers; Dr. R. W. Raymond, secretary; W. B. Kunhardt, acting secretary for the metallurgical section; Prof. William H. Pettes of the University of Ann Harbor, acting secretary for the mining section; John Birkinbine, Philadelphia, Pa.; Dr. David T. Day, United States Geological Survey; E. G. Spilsbury, Trenton Iron Works; W. B. Cogswell, manager Solvay Soda Process Company, Syracuse, N. Y.; Hon. Eckly B. Coxe, president of the American Institute of Mechanical Engineers; Prof. R. H. Richards, Massachusetts Institute of Technology, Boston, Mass.; Prof. H. S. Munroe, Columbia College, New York; Dr. Clement Le Neve Foster, mining inspector, Llandudno, Wales; F. Freytag, Chemnitz, Germany; A. Fitzner, Laurahütte, Germany; John Fritz, Bethlehem Iron Company, Bethlehem, Pa.; Rudolf Franke, Hanover, Germany; Dr. Persifer Frazer, Philadelphia, Pa.; A. W. Fiero, Chicago; Alfred Flamant, Paris; Dr. Karl Goldschmidt, Verein deutscher Eisenhüttenleute; A. Grille, Paris; Stanislaus Grodski, Warsaw, Poland; A. von Jehring, Technical University at Aachen, Germany; D. S. Jacobus, Hoboken, N. J.; Lieut. Wm. H. Jaques, South Bethlehem, Pa.; Wm. Kent, Hoboken, N. J.; Professor Krupky, Technological Institute, St. Petersburg, Russia; W. J. Keep, Detroit, Mich.; Geo. F. Kunz, mineralogist for Tiffany & Co., New York; Com. Chas. H. Loring, United States Navy; Prof. Alfred Lütken, Copenhagen, Denmark; A. Fteley, New York; F. L. Clerc, Joplin, Mo.; H. A. Cohen, Morey, Nev.; H. M. Chance, Hokendauqua, Pa.; Prof. F. J. H. Merrill, New York State Museum, Albany, N. Y.; F. Collingwood, secretary Society of Civil Engineers; Edgar S. Cook, Pottstown, Pa.; W. Hartmann, Verein deutscher Ingenieure; Dr. Ernst F. Dürre, Aachen, Germany; Carl Dellwik, Paul Debray, Paris; C. Freytag, Christian Dütting, Neunkirchen, Germany; K. Dümmler, Berlin; F. Dümiloff, Moscow; Adolph von Drebbler, Essen, Germany; Prof. James E. Denton, Stevens Institute of Technology; Dr. Thos. M. Drown, Massachusetts Institute of Technology; T. W. Ernst, Winterthur, Germany; H. Engels, Dresden; Richard Eger, German Society of Architects, Berlin, Germany; W. H. Case, Pulaski, Va.; Philip Argall, Gilpin County, Col.; Robt. Allison, Port Carbon, Pa.; Prof. Ira O. Baker, University of Illinois; Prof. Hilary Bauermann, London, England; Ferdinand Brunner, W. Bernhard, Saint Petersburg (Imp. Institute of Tech.); Otto Berner, Hamburg; M. Annam, Bouly, France; J. H. Bunte, Karlsruhe; Frank Brewer, *Industries and Iron*, London, England; David Baker, Maryland Steel Company, Sparrow's Point, Md.; Alexander von Babo, Franz Cazin, Denver, Col.; Chevalier Celso Capacci, College of Engineers and Architects, Firenze, Italy; Marquis de Chasseloup-Laubat, Paris; E. J. Chibas, representative of Colombia, Colon, South America; Prof. S. B. Christy, University of California; Thos. Clarkson, London; Prof. A. Caméré, Engineer of Roads and Bridges, Paris; Eugene de Zelenkoff, St. Petersburg, Russia; Hermann Zimmermann, Berlin; Alfred Liewen, Moscow; Wm. Metcalf, president American Society of Civil Engineers; Robert Mannesmann, Remscheid, Germany; E. Mangematin, Le Creusot; Edward Mitscherlich, Imperial



Russian Commission; Geo. W. Melville, U. S. N.; A. G. Menocal, chief engineer Nicaragua Canal Company; J. R. Oldham, "Lloyds," Eben E. Olcott, New York; Prof. J. R. Procter, British Iron and Steel Institute; Baron Quinette de Rochemont, Inspector of Roads and Bridges, Paris; S. H. Sharpless, Boston, Mass.; John C. Trautwine, Jr., Philadelphia; W. H. Van Arsdale, Aurora, Ill.; Peter Vedel, Copenhagen, Denmark; Dr. Hermann Wedding, Berlin; S. T. Wellman, Thurlow, Pa.; George Weinstein, Russian Imperial Technical Society; Geo. W. Goetz, Milwaukee, Wis.; E. V. d'Inwilliers, Pennsylvania Geological Survey, Philadelphia, Pa.; R. A. Hadfield, Sheffield, England; F. W. Gordon, Philadelphia, Pa.; Major Jed Hotchkiss, Staunton, Va.; E. Russell Tratman, New York; H. L. Hollis, Chicago, Ill.; Prof. B. E. Fernow, Chief of the Forestry Division, U. S. Department of Agriculture; H. L. Winchell, J. F. Lewis, Rand Drill Company, Chicago; Prof. Arthur Winslow, State Geologist, Jefferson City, Mo.; Prof. W. P. Blake, Shullsburg, Wis.; Prof. T. A. Rickard, New York.

#### TUESDAY.

There was no session of the mining division on Tuesday, in order that the members might attend the session of the Mechanical Engineers, where the subject of tests of materials was under discussion.

In the division of metallurgy, the paper of James Douglas on "A Summary of American Improvements and Inventions in Ore Crushing and Concentrating, and in the Metallurgy of Copper, Lead, Gold, Silver, Nickel, Aluminum and Zinc," brought out a lengthy discussion.

Prof. T. A. Rickard's paper on "The Limitations of the Stamp Mill" led to some good discussion of the comparative merits of heavy stamps with low drop compared with light stamps with high drop—i. e., the Colorado compared with California practice.

Tuesday evening was ladies' night at the engineering headquarters, at 10 Van Buren street. About 500 engineers and their ladies were present and made the event thoroughly enjoyable.

#### WEDNESDAY.

In addition to papers on the general subjects of "Ventilation and Safety," the discussion of the papers of Posepny and Emmons on "Ore Deposits" was continued. The discussion consisted principally of local additions and corrections concerning the Mississippi Valley, by Prof. W. P. Blake and Prof. Arthur Winslow.

The theme in the metallurgical division was "The Physics of Steel." The principal papers were "Microscopic Metallography," by F. Osmond, Paris; "Micro-structure of Ingot Iron in Cast Ingots," by Prof. A. Martens, Berlin, Germany; "Segregation and Its Consequences in Ingots of Iron and Steel," by Alexandre Pourcel, Paris; "Micro-structure of Steel," by Albert Sauveur, South Chicago, and "Heat Treatment of Steel," by H. M. Howe of Boston.

In discussing Mr. Pourcel's paper on segregation in iron and steel ingots, A. C. Cunningham gave some interesting examples of steel fractures due to segregation, and gave the following extract from a specification recently prepared by him, designed to provide for segregation in a high-grade Bessemer steel: "Samples taken from the steel when poured shall show an amount of phosphorus not exceeding 0.06 per

cent., and sulphur not exceeding 0.05 per cent. Drillings taken from any part of the finished material shall show an amount of phosphorus not exceeding 0.07 per cent., and sulphur not exceeding 0.06 per cent."

W. J. Keep continued the discussion by calling attention to some specimens of Swedish pig iron on exhibition at the exposition, which, though cast in iron molds, was not all white, but showed gray iron in the parts which cooled comparatively slowly. In explanation of this, T. Bergendal of Söderfors, Sweden, remarked that the iron in question—a mixed gray and white metal for the "Lancashire" refinery process—frequently changes in texture according as the charge of the blast furnace is more or less basic, other conditions remaining the same. Thus, when the slag is more basic a pig iron will be obtained with both the gray and white sharply divided, while with more acid slag the colors will be more irregularly mixed. Which of the several kinds is to be preferred depends upon the purpose for which the pig iron is used.

Dr. Thomas M. Drown of the Massachusetts Institute of Technology contributed to the segregation discussion from his analogous experiments on the segregation of impurities from water by freezing. In making artificial ice the conditions are very similar to those which obtain in the cooling of steel or iron, only the rate of cooling is very much slower. Thus a can of water about 13½ inches square and 32 inches high, holding about 200 pounds of water, requires about two days to be frozen. In such a case one would expect the greatest concentration of impurities to be in the middle or upper portion of the interior cone, but in the blocks examined the largest amount of impurities was found in the lower portion of the interior of the blocks. This was due doubtless to some peculiarity in the circulation of the cold brine around the outside of the can.

Bearing on the question of the relation between the degree of elimination of impurities and the rate of cooling are the results of analyses of different layers of natural ice cut from a deep pond. The water of the pond contained a considerable amount of dissolved and suspended impurities, and it was noticed that each successive layer from the top downward was purer than the one above. There could have been no difference in the conditions of freezing in these layers, except the rate; that is to say, the rate of freezing was probably slower as the ice increased in thickness.

The subjects for the day were further discussed by Messrs. W. R. Webster, R. A. Hadfield, E. D. Campbell, H. M. Howe, A. Sauveur, A. A. Stevenson, H. D. Hibbard and A. Martens.

#### THURSDAY.

While the mining section considered miscellaneous topics, including "Improvements in Ore Dressing," by Oberbergrath O. Bilharz, Berlin, Germany; and "The Bertha Zinc Mines," by W. H. Case, Pulaski, Va., the metallurgical section was devoted to "Steel Making Processes." The session was opened by a paper by Prof. Richard Akerman, Stockholm, Sweden, on "The Bessemer Process as Conducted in Sweden." J. L. Sebenius presented a written discussion descriptive of the rotator for making solid ingots.

#### FRIDAY.

"Fuels and Cement" was the general subject for the mining section,

and the session was chiefly devoted to reading and discussing a paper by Hon. Eckley B. Coxe on "A Furnace with Automatic Stoker and Traveling Grate Especially Adapted to Burn the Small Anthracites." Among the interesting points developed in the discussion Mr. Coxe stated in regard to the possibility of burning anthracite dust that he had no doubt that dust could be successfully burned, but the difficulty lay in obtaining anthracite dust. Only a very small percentage is obtained from culm heaps, and he doubted whether dust could be prepared for anything like a reasonable cost. It was further shown that the ordinary dust is unusually rich in ash; indeed, a case was noted where the dust was sufficiently argillaceous to yield good fire brick.

Other papers presented for discussion were "Consumption of Fuel in the Taylor Gas Producer Plants at Aspen and Marsac Mills Compared," by C. A. Steinfeldt, San Francisco, Cal. "A New Direct Process for the Production of Pig and Refined Iron," by Alexander Sattmann, Donawitz, Austria; read by title. "Sulphur in Cast Iron," by W. J. Keep, and "Blowing Engines," by Julian Kennedy, which was discussed by T. C. Brooks and F. W. Gordon.

Friday evening was devoted to a reception in the Mining Building at the exposition. It was given to the Engineering Congress by Hon. F. J. V. Skiff, chief of the Mining Department, his staff and the exhibitors. The building was illuminated, the machinery was in operation, souvenirs were dispensed and a collation served. Addresses of welcome were made by George F. Kunz on behalf of Mr. Skiff, who was unable to be present on account of severe illness. Messrs. Birkinbine and Howe responded, and expressed, on behalf of the engineers, gratitude for the rooms arranged for their accommodation in the Mining Building. The evening ended with a visit to the Midway Plaisance, where the chief attractions, including the Ferris wheel, were thrown open to the engineers.

The congress closed formally at noon on Saturday with congratulatory addresses by the officers and foreign commissioners, but those who remained over continued the festivities in the evening by a reception at the headquarters.

The metallurgical section considered pig iron. E. C. Potter presented "A Review of American Blast-Furnace Progress," which led to considerable discussion by W. H. Morris of Pottstown, T. W. Robinson of Pueblo, Col. (who gave some interesting data in regard to the Colorado Fuel & Iron Company's blast furnace), E. S. Cook of Pottstown and John Birkinbine of Philadelphia.

Mr. Birkinbine referred to the fact that the bulk of advancement in blast-furnace practice had been within the last 25 or 30 years; that to-day in this country there are active furnaces through all gradations from the cold-blast charcoal furnace, with its square stone stack, blast cylinders and water wheel, producing only 3 or 4 tons daily, to the modern monster coke furnace, producing 100 times the amount of iron that its ancient prototype made. He credited technical knowledge with much of this advancement, and claimed that the chemist, the manager and the engineer had made the real advance by determining the composition of materials, by studying the reactions in the blast furnace, by applying labor-saving

machinery to operation, and by using skill in designing and construction.

Mr. Birkinbine called attention to the demands for richer ores made by blast furnaces, and the development of the pig-iron industry in new districts or sections of the country.

Replying to a question from President Howe, concerning the probability of the long-expected annihilation of the charcoal pig-iron industry, Mr. Birkinbine expressed his belief that the United States will continue to produce from 500,000 to 750,000 tons of charcoal iron annually; that the restriction of this branch of industry is due to the difficulty of producing in one locality, or assembling at one point, sufficient fuel to support large plants, and consequently, even with cheap fuel, good ores, &c., the charcoal furnaces have the disadvantage of having to divide fixed charges by smaller tonnages.

The discussion by William H. Morris showed favorable results in producing pig iron for use in the basic Bessemer process by the Pottstown Iron Company. The pig iron desired should contain not more than 0.4 per cent. silicon and 0.04 per cent. of sulphur, and must not contain more than 0.75 per cent. of silicon or 0.08 per cent. of sulphur. With an ore mixture of 30 per cent. mill cinder, 55 per cent. of mixed magnetites from New York and New Jersey and 15 per cent. of hematite, the furnace averaged 850 tons weekly, using  $1\frac{1}{2}$  tons of anthracite fuel, and less than 5 per cent. of the product was unfit for use in the basic converter. In July, 1892, only 1.7 per cent. was rejected; in August, only 1.1, and in December none. The phosphorus was kept within 0.2 per cent. of the amount given by the Bessemer manager by varying the ore mixture. It was at times as high as 3 per cent. and as low as 2.25 per cent.

Reports from members of the Iron and Steel Roofers' Association confirm rumors of hard times in that industry. At Canton, Ohio, the principal seat of the industry, there is very little doing. In ordinary times fully 750 tons of black and galvanized sheets are consumed by roofing concerns during one month. It is now stated on good authority that 200 tons would probably exceed requirements. St. Louis manufacturers are in about the same shape, and the Cambridge Roofing Company, Cambridge, Ohio, are only running two days each week. This is usually the busiest season of the year for the roofing trade. A revival is hoped for and confidently expected during the latter part of this month.

The Harrisburg, Pa., sheet mill of the Lalance & Grosjean Mfg. Company was lately shut down for three weeks, owing to lack of water. This defect has been remedied by the connection of the works with the city water system and the mill is again in full operation. The company report a large demand for their black sheets for tinning purposes. All the material that they do not consume at their Woodhaven factory is readily bought by the American tin-plate manufacturers.

The Board of Experts now sitting at the Navy Department to select a design for a submarine boat will visit Chicago to witness trials of the Baker and the Holland boats, in order to reach a definite conclusion as to their respective merits.

### The Foundrymen's Association.

The regular monthly meeting of the Foundrymen's Association was held at the Manufacturers' Club in Philadelphia, on Wednesday, August 2, P. D. Wanner of the Mellert Foundry & Machine Company of Reading, Pa., occupying the chair in the absence of the president. The minutes of the last meeting were read and approved. There were no reports from the different committees, as no meetings had been held since the last regular meeting of the association, many members being absent. The secretary mentioned that he had been in communication with leading firms in various sections, for the purpose of ascertaining the state of trade, and read several letters which he had received. The general tone of the letters pointed to a marked depression in business. In some sections there was a fair amount of business offering, but collections were in such a very unsatisfactory state that a few factories had ceased running.

The secretary also announced that he had written to the editor of *The Iron Age* for information with a view to increasing the New York membership in the association, and that he had a reply with the suggestion that the association hold one of its meetings in New York. On motion the correspondence was ordered to be filed.

The secretary reported that he had received a communication from a firm in South Boston intimating that an effort was being made to establish a Foundrymen's Association in Boston, and asking for a copy of the by-laws of this association, and for any other information likely to help them with the movement.

In reference to the subject of the employment by the association of a chemist to whom members could refer for analyses and advise, at a rebate on fixed charges, as discussed at the last meeting, the secretary read a letter from a chemist, Wm. Molin of New York, offering his services to the association upon plans which he considered would meet their views, and would secure to each member all the advantages enjoyed by concerns employing chemists at very small cost. Owing to the small attendance the matter was referred to the next meeting.

Mr. Molin was present and delivered an interesting address in further explanation of his offer and the value of a chemist's services to foundrymen in general. He instanced many cases of sales where analyses would have resulted in a large saving to purchasers. Irons, he said, often looked very valuable when judged from a fracture, but on analysis they would be found to be of a quality which would kill instead of improve a mixture. He had, on analysis, found No. 2 brands, which had been graded by fracture, to be of better service than No. 1 brands. He gave particulars of some interesting analyses which he had made of branded irons.

He said a foundryman in New York once bought some No. 1 iron to use as a softener in a mixture he was using. The iron was of dark color and very open in grain—in fact, as beautiful an iron as it was possible to imagine. After a little of it had been used it was discovered that every casting made from it chilled so much as to be of no use, and had to be remelted. On analysis the iron was found to be quite unsuited for the purpose it was required for and the No. 2 iron of the same

grade was found to be better than the No. 1. The analysis was as follows:

	No. 1.	No. 2.
Total carbon.....	3.880	4.220
Graphitic carbon.....	3.310	3.740
Combined carbon.....	0.570	0.480
Silicon.....	1.559	1.641

Another iron upon analysis showed that No. 2 and No. 3 were quite as good as No. 1; in fact, for all round purposes No. 3 was rather the best and certainly the cheapest. The analysis was as follows:

	No. 1.	No. 2.	No. 3.
Total carbon.....	3.630	3.405	3.015
Graphitic carbon.....	3.580	3.320	2.950
Combined carbon.....	0.100	0.085	0.065
Silicon.....	3.035	3.502	3.898
Manganese.....	0.287	0.668	0.651
Sulphur.....	0.016	0.027	0.034
Phosphorus.....	0.741	0.520	0.582

He also gave an interesting analysis of some castings made from irons containing too much silicon, as follows:

	Annealed.	Annealed very hard.	Un-annealed.
Carbon.....	0.200	0.060	0.070
Silicon.....	3.810	4.343	3.810
Not safe enough to drill without annealing.			Very hard scale. Difficult to polish.

He mentioned that a manufacturer of steam pumps once called upon him in regard to complaints for a long time received concerning the material of which the pumps were made. It was found that the water in the mines where the pumps were used had the effect of dissolving the iron. Upon analysis the iron was found to be composed as follows:

Total carbon.....	3.100
Graphitic carbon.....	3.050
Combined carbon.....	0.050
Silicon.....	2.022
Manganese.....	0.286
Sulphur.....	0.050
Phosphorus.....	0.693

The trouble was found in the fact that it contained too little combined carbon.

Mr. Molin was tendered the thanks of the meeting for his remarks. The secretary, in referring to the inquiries sent out by the Secretary of State to the Consular officers in England, France and Germany, announced that he had not yet received a copy of the reports of such officers, although he had been given to understand that they had been printed and distributed. He believed that Mr. Sterling of the Harlan & Hollingsworth Company, who was then present, had a copy with him and would doubtless favor the meeting with a reading of such details as would be most interesting to foundrymen.

Mr. Sterling thereupon read the reports, details of which appeared in *The Iron Age* of August 3. Mr. Wanner, in referring to the resolution passed by the association at its last meeting, urging upon Congress the immediate repeal of the silver-purchasing clause of the Sherman act, said that he was of the opinion that in this country people who could help themselves or who were expected to help themselves, did not receive very much attention at the hands of their law makers. He believed that manufacturers and employees of the country generally, or the great majority of them, would wish Congress to meet and promptly repeal the silver-purchasing clause of the Sherman act, and then go home. The financial condition of the country, he said, would then improve, the people would regain confidence and business would be resumed. He reviewed the state of trade which might be expected if Congress did not act quickly, and expressed a hope that something would be done before distress came among the working people.

The meeting then adjourned.

## OBITUARY.

## JOHN HEAD.

The death is announced, in London, of John Head, a well-known English civil engineer, on July 14. Mr. Head was principal assistant to the late Sir William Siemens from 1860 until the time of Sir William's death; since which he managed the civil engineering business in London of Frederick Siemens. He was a member of the Institute of Civil Engineers of Great Britain, of the Iron and Steel Association, and of other bodies; and was also the author of numerous papers on metallurgical subjects presented to the latter and other kindred societies.

## JARVIS B. BROWN.

Jarvis B. Brown, president of the Anglo-American Iron & Metal Company of 213 Pearl street, New York, and Orange, N. J., died August 4, at his residence in Roseville, N. J., of typhoid pneumonia. Mr. Brown was but 34 years of age, yet he had acquired a general knowledge of steel products which in scope and value is rarely attained. He was at one time connected with the firm of Hicks & Dickey of Philadelphia, and later with the Benjamin Atha & Illingworth Company of Newark, N. J.

## CHARLES G. OTIS.

Charles G. Otis died at his residence, 131 Pacific street, Brooklyn, at half-past one o'clock Monday afternoon from the effects of a violent attack of gastritis. He was born in Troy, this State, in 1831. He and his brothers began the manufacture of passenger and freight elevators in a small way in the early sixties. Their business grew, and with the popularity which followed the introduction of passenger elevators and the dawn of monster buildings the field was widened and competitors sprang up. The brothers determined to extend their operations in 1874 to keep pace with the growing demand and formed a stock company under the title of Otis Brothers & Co. Outsiders with capital to invest were taken in and a large factory was erected in Yonkers. A factory was also erected in Chicago. The output from these establishments was shipped to every civilized country. The working capital of the company was fixed at \$600,000. Norton P. Otis is president, Abraham G. Mills secretary and Wm. D. Baldwin treasurer.

## E. S. MOFFAT.

E. S. Moffat, president of the Lackawanna Iron & Steel Company of Scranton, died suddenly in Edinburgh, Scotland, where he had been staying with his wife and son. Mr. Moffat was born at Oxford, Ohio, January 5, 1844, and was the son of Rev. Jas. C. Moffat. While a student at Princeton he entered the Union Army and served to the end of the war, being for the greater part of the time a lieutenant in the Signal Corps. He entered Columbia College, where he was in the class of 1868. For a time he was a tutor in the Pardee Scientific Department of Lafayette College. His active professional work began in 1872, when he became superintendent of the Port Oram Furnace, remaining until 1876, when he took charge of the Secaucus Furnace. From 1878 to 1882 he was connected with the Musconetcong Iron Works, and then entered the service of the Lackawanna Company, in which he rose to the post of general manager of the works and president.

## San Francisco News.

The figures for foreign imports of pig iron and steel and their manufactures for the first six months of the present year have just been compiled. They are as follows:

Pig tin, pounds.....	1,897,437	\$375,362
Pig iron, tons.....	1,937	12,832
Scrap iron, tons.....	203	3,479
Bar iron, pounds.....	789,068	13,092
Railroad bars, tons.....	681	14,573
Tin plate, pounds.....	21,400,730	611,198
Wire & wire rods, lbs.....	813,724	17,184
Anvils.....	64,831	7,156
Steel ingots.....	3,731,498	39,770
Sheet, plate, &c., lbs.....	2,078,939	36,421
Chains, pounds.....	4,202	188
Iron ore, tons.....	1,132	4,545
Cutlery.....		3,418
Files.....		1,651
Firearms.....		810
Machinery.....		20,220
Iron and steel, all other.....		5,269
Total value.....		\$1,167,168

The total for the first six months of 1892 was larger—\$1,247,791—the decrease from that year being principally in tin plate and pig and scrap iron. The amount of pig tin imported for the half year largely exceeds that for the same time in 1892—by nearly 1,000,000 pounds and by about \$250,000. Our imports of scrap iron have been almost nil, those of pig iron less than half that for the same time in 1892. The cause of the heavy imports of pig tin was the desire to escape the duty of 4 cents per pound, that of the falling off in pig iron the prospect of the removal of the duty this year. The same motives had their effect in shutting off the imports of scrap. Besides, business has not been as good with the foundries as it should have been. There was a falling off of about 1,000,000 pounds in the imports of bar iron for the same reason; steel ingots were of nearly the same volume as in 1892 for the same time; there was a considerable increase in the importation of sheet iron, as also in that of machinery. For the same time in 1892 we imported one-third more tin plate. Our imports of wire rope increased.

As there will probably be a reduced pack of both salmon and fruits this year, the reduced imports of tin plate are thus explained. It will be noted that the importations of tin plate and pig tin make up together almost a million dollars in value. Deduct this and there will be very little left of our foreign trade in iron and steel and their manufactures. We obtain the greater part of our imports of this class of goods from the East. This is more marked now than ever in consequence of the heavy imports of Eastern iron by sea for the past couple of years. Should, however, the tariff be "reformed," as it is called, and pig iron, ingot steel and other raw material be allowed to come in duty free, there would be a material change in the currents of our trade and in our business methods. A great manufacturing interest would arise here and our supplies of Eastern goods would be proportionately reduced. Not only that, but our manufacturers would invade Oregon, Washington, Arizona, Utah, Colorado, Montana and Idaho—mayhap other States and Territories this side of the Mississippi. It would put new life into the city, which it needs badly when we consider the general state of the markets. The sales of agricultural implements may be said to have been good—in fact, quite up to the average of former years. Arrivals have been free. Prices, however, have had to be cut closer than ever. The sales during the fall will be restricted unless an improvement takes place in the financial situa-

tion generally and in the price of farm produce. There have been very heavy imports of hardware by sea, both by Cape Horn and by the Isthmus route since the competition in the steamship business began, but the supplies by rail have fallen off conspicuously, and on the whole we believe that supplies have been less than they were a year ago. Certain it is that business has been very quiet during the half year on account of low prices and the difficulty of obtaining money. Crops of all kinds have been good, and under other circumstances, especially with better prices, we could have looked for an especially good trade.

Business for the past two weeks has been very dull—sales the lightest known in years.

## PERSONAL.

Loudon W. Richards has left the service of the Maryland Steel Company to take the position of superintendent of the open hearth department of the Pottsville Iron & Steel Company.

I. L. Morris has resigned his position as manager of the Peoria Iron & Steel Company, Peoria, Ill.

Josef von Ehrenwerth, the Austrian metallurgist, who first became famous through his theoretical researches on the basic steel process, is now in this country.

Reports from the Canal Dover, Ohio, district are a little more encouraging this week. The blast furnace of the Penn Iron & Coal Company is running and making steady shipments. The coal mines and fire brick works of the Tuscarawas Valley are all in operation. Reeves Iron Company, Canal Dover, are running all their mills and have resumed shipments. The New Philadelphia Iron & Steel Company are working on orders for prompt shipment. It is now reported that the Cambridge Rolling Mills will run steadily instead of part time, as announced last week, and the Corns Iron Company, Massillon, are getting things into shape that leads to the belief that operations will be resumed at an early date. The Cambridge Corrugating Company, a concern which commenced operations last year, have just moved into their new building. They are making some shipments. Among foundries and machine shops little is doing. Hopkins, Ripple & Co., Canal Dover, are keeping their men employed on repair work and duplicate castings for rolling mills and blast furnaces. The Cambridge Foundry Company expect to resume in full this week. The Cambridge Roofing Company, an old established corrugating and iron and steel roofing concern, report considerable improvement in trade this week. They have received good sized orders from desirable customers, and expect to run their works to full capacity. Recently their painting shop has been extended and sheet carriers 100 feet long attached to their painting machines. They have also set up a new corrugating machine, which will corrugate sheets as heavy as No. 16 gauge, and a line of pipes which will convey cold air through the shops in the summer and warm air in the winter.

The Washington Coal & Coke Company of Dawson, Fayette County, Pa., have been granted a charter with a capital stock of \$250,000.

# MANUFACTURING.

## Iron and Steel.

Owing to the blowing out of so many furnaces in the Pittsburgh district, the amount of pig iron now being made in Allegheny County is considerably smaller than for many years past. Taking the 26 furnaces in that district in alphabetical order, it is found that one Carrie Furnace of the Carrie Furnace Company is idle undergoing repairs. Clinton of the Clinton Iron & Steel Company has been idle for several months past undergoing relining and repairs, and will not resume for possibly 60 days yet. At the Edgar Thomson furnaces, at Bessemer, three stacks have been blown out, these being A B and C, and in all probability more will be closed down during this month. Edith, in Allegheny, operated by the Oliver Iron & Steel Company, is still in operation, turning out about 1000 tons of Bessemer iron per week. The three Eliza furnaces of Laughlins & Co. are all in operation and turned out 22,270 tons of iron last month. The two Lucy furnaces, Pittsburgh, operated by the Carnegie interests, are both banked down for an indefinite period. The same is true of the two Monongahela furnaces, at McKeesport, operated by the Monongahela Furnace Company, an identified interest of the National Tube Works Company. The two stacks of Shoenberger & Co. are in operation, while Soho, of the Moorhead-McCleane Company, has been idle for more than two years with no immediate prospects of resuming blast. From the above it will be seen that of the 26 stacks in Allegheny County 15 are idle and it is estimated that the production of pig iron in the Pittsburgh district alone has been cut down fully 14,000 tons per week.

Anderson, DuPuy & Co., operating the Pittsburgh Steel Works, at Chartiers, near Pittsburgh, have notified their employees that a reduction of 10 per cent. in the wages of skilled workmen and of 5 cents per day in laborers' wages will go into effect immediately upon the resumption of operations. For some years this concern have not signed the Amalgamated Association scale, but have arranged a private scale with their workmen. The plant of the firm contains 15 heating furnaces and two 33-pot crucible steel melting furnaces. The melters in the crucible department have been receiving \$5.50 per ton, and under the proposed reduction they will receive \$4.95. Open-hearth melters were paid \$2.50 before the mill shut down, and the firm now want to pay this class of workmen \$2.25. In the melting department prior to March last the helpers were paid \$3.65 for pulling 16 pots. In March they were reduced to \$3.50 for the same amount of work. It is now proposed to pay these men \$3.15. In the open-hearth department the first helper formerly received \$2.35 per day; mold setter, \$2.15; chargers, \$1.90; ladlemen, \$2.15; hammermen, \$5 per ton; roughers, \$3.50; heaters, \$3.50; straighteners, \$2. All of these men will be affected to the same extent by the 10 per cent. cut. When the March reduction was made a straight cut of 10 per cent. was made in the melting department and smaller cuts on the other jobs. The boss melters took half of the reduction and divided the remaining 5 per cent. among the helpers.

No. 1 Furnace of the Andrews & Hitchcock Iron Company, at Hubbard, Ohio, has been blown out for repairs. In the meantime furnace No. 2 is being lined as rapidly as possible and when repairs are completed it will be immediately put in blast.

The American Tube & Iron Company, operating plants at Youngstown, Ohio, and Middletown, Pa., which concern have gone into the hands of a receiver, have notified their employees at both plants of a reduction of 10 per cent. in wages to go into effect when operations are resumed. As soon as necessary stock taking and other details incident to the receivership have been arranged both plants will be put in operation.

In the United States Court at Jackson, W. Va., on August 1, upon application of Edward H. Cole of Wheeling, John B. Eaton of Pittsburgh was appointed receiver of the Oil Well Supply Company's property in West Virginia.

All shipments of ore to the Edgar Thomson Steel Works and blast furnaces, at Bessemer, Pa., have been ordered stopped. This is due to the fact that a large stock of both ore and coke is on hand, which, with

the restricted operations at Bessemer, is sufficient to run blast furnaces and steel works for some time to come.

The entire works of the Tyler Tube & Pipe Company, at Washington, Pa., have been closed down for stock taking and also to facilitate the making of some extensive additions to equipment. It will be several weeks yet before repairs and additions have been completed, and the plant will be idle during that time. When ready for operations the firm will have about doubled their capacity for the manufacture of charcoal iron and special steel boiler tubes. The statement that a strike had occurred at the above plant on account of a slight reduction made in wages of certain employees is without foundation. Some 35 or 40 unskilled workmen were notified of a reduction in wages and refused to accept it. The firm do not anticipate any serious difficulty in filling the positions of the men who have left their employment when they are ready to resume operations.

Monongahela Furnaces of the Monongahela Furnace Company, at McKeesport, Pa., have both been banked down for an indefinite period on account of large stocks of iron on hand, and also from the fact that much of the product of these furnaces is used by the National Tube Works Company, whose plant has been closed down for some time past for repairs and stock taking. The capacity of the two Monongahela furnaces is about 3000 tons per week.

Zug & Co., Limited, operating the Sable Iron & Nail Works, at Pittsburgh, signed the Amalgamated Association scale last week, and a part of their plant was put in operation on Monday, the 7th inst. The equipment of their plant consists of 42 single puddling furnaces, 11 heating furnaces and 6 trains of rolls, the product being merchant bar iron and the annual capacity 25 000 net tons. The merchant iron manufactured by this concern is of a superior quality, and the greater portion of it is disposed of to the trade in the New England States. Considerable significance is attached to the signing of the scale by this firm, as they were represented in the numerous conferences held in Pittsburgh last month, and are the third firm in the Pittsburgh district employing Amalgamated Association labor that have signed the scale, the two previous signatures being those of Jones & Laughlins, Limited, and J. Painter & Sons Company.

The Beaver Falls Mills, at Beaver Falls, Pa., whose product consists of wire rod and wire nails, have been closed down for an indefinite period, all machinists and other men having been paid off and discharged, and an additional force of watchmen have been hired and will be placed on duty.

Advices from Reading, Pa., state that the Carpenter Steel Company of that city by reason of new contracts will immediately commence the erection of two new crucible furnaces, and will give employment to a large number of additional men. The firm also announce that hereafter wages will be paid in gold. The firm have just been awarded a contract to furnish the War Department of the United States Government with 200 12-inch shells, which are similar to those recently tested at Indian Head. Each of the shells will weigh 850 pounds.

The annual meeting of the stockholders of the Pittsburgh Forge & Iron Company will be held in that city on Tuesday, the 15th inst., for the election of directors.

The statement is made that the Mannesmann Tube Company propose to build a plant in this country. The location has not been selected as yet.

The Britton Rolling Mill Company, Cleveland, Ohio, are operating their plate mill and turning out 50 to 60 tons per day. Their sheet mills are not running at present. Engines and other machinery for two black plate mills for tinning are on the ground, but will not be erected until the present unsettled condition of national affairs is changed.

Under date of the 2d inst., the following press dispatch was sent out from Elwood, Ind.: "Information reached here this evening that the tin-plate factory at Atlanta, Ind., south of this city, had passed into the hands of the receiver. Operations were suspended this morning and the works locked up. The superintendent, Enoch Stanford, was formerly superintendent of the American works, north of this city. He, together with M. P. Elliot of Kokomo, was largely interested in the Atlanta plant, which has been in operation six months and was apparently prospering. Particulars as to

the cause cannot be obtained this evening, but it is ascribed to dull times and financial stringency."

The Phoenix Horse Shoe Company have almost completed their plant at Joliet, Ill., and expect to have it in full operation in the course of a few weeks.

Arrangements have been made to continue operations at the works of the East Chicago Iron & Steel Company, East Chicago, Ind. Parkhurst & Wilkinson, who recently assigned at Chicago, were largely interested in this concern. Frank B. Felt, general manager, continues in charge of affairs.

The rolling mills and puddling department of the Calumet Iron & Steel Company, Cummings, Ill., are closed down. New furnaces are being added, together with other improvements, and the roofs of the buildings are undergoing repairs. It is reported that the steel plant of this company will be started up in September.

The Reeves Iron Company, Canal Dover, are now running their plant to its full capacity. A new warehouse has just been added and is ready for use. Thomas Richards has resigned his position as sheet-mill superintendent. The mills are now in charge of General Superintendent Jabez Reeves.

The entire plant of the La Belle Steel Company, Allegheny, Pa., was closed down for an indefinite period on Saturday, the 5th inst., with the exception of the 9, 10 and 14 inch mills, which will be kept in operation until orders on the books have been filled. The company give employment to about 840 men, and are one of the oldest steel manufacturing concerns in the country, and have heretofore always enjoyed a large trade, finding a ready sale for their product.

Every department of the works of the Liggett Spring & Axle Works, in Allegheny, Pa., has closed down for an indefinite period, owing to a lack of orders.

About 2000 employees of the Edgar Thomson Steel Works, at Bessemer, Pa., have been affected by an order just issued to the effect that hereafter no more than single time would be paid for Saturday night and Sunday work. Heretofore the men have been paid time and half time for Saturday night work and double time for Sunday. The men affected are machinists and day laborers.

Three departments of the Juniata Iron & Steel Works of Shoenberger & Co., at Pittsburgh, resumed operations on Monday, August 7. These comprise two plate and sheet mills and the horseshoe department. The entire plant of this firm is operated by non-union men and no scale is signed, although Amalgamated Association prices are paid, except in the Bessemer department, where a private scale is arranged between the firm and their employees.

The Scottsdale Iron & Steel Company, Limited, Scottsdale, Pa., manufacturers of muck bar and sheet iron, have signed the Amalgamated Association scale, and part of the plant has been put in operation.

As announced in these columns some time since, the Brown, Bonnell Iron Company, Youngstown, Ohio, will dismantle Falcon Furnace. We are now advised that in its place the firm will erect a modern blast furnace, work on which will probably be commenced during the next three or four months. As yet it has not been decided as to the measurements of the furnace, but it will be equipped in a modern manner throughout and will have all the latest improvements in blast-furnace practice.

A labor trouble which has existed at the works of Spang, Chalfant & Co., at Etna, Pa., near Pittsburgh, for several months past, was settled last week. The trouble was started by the firm discharging four puddlers who belong to the Amalgamated Association, and when this was done the balance of the puddlers and a number of other workmen refused to work until the discharged men had been reinstated. A number of conferences were held between the members of the firm and officials of the Amalgamated Association, but the firm positively refused to take back the four discharged men and announced that hereafter no scale would be signed for any department of their works. Most of the men who left their positions have returned to work and the mill has been declared open by the Amalgamated Association. Scale prices will be paid, but the above organization will not be recognized and no scale will be signed.

Sheet mills Nos. 1, 2, 4, 5 and 7, the bar mill and one heating furnace in the works



of the United States Iron & Tin Plate Mfg. Company, at Demmler, Pa., were put in operation on Monday, the 7th inst. These departments comprise more than one-half of the entire works and give employment to about 300 men, and it is stated that within a short time the balance of the plant will be put in operation.

Recently ground has been broken by the Mahoning Valley Iron Company of Youngstown, Ohio, for the large addition to their plant, which has been under consideration for some time.

The blast furnace of the Wheeling Steel Company of Wheeling, W. Va., formerly known as Benwood, has been rechristened and is now known as "Martin's Ferry."

The James P. Witherow Company, engineers and contractors, at Pittsburgh, have bought at forced sale the property of the Sheffield Furnace Company, at Sheffield, Ala. It will be remembered that a claim for some \$81,000 against the Sheffield Furnace Company, held by James P. Witherow, was recently decided in favor of Mr. Witherow by the Supreme Court. It is the intention of the purchasers of the plant to dispose of it when business improves.

Last week the Lake Side Nail Company of Chicago, with works at Hammond, Ind., signed the Amalgamated Association scale.

The Wilmot & Hobbs Mfg. Company of Bridgeport, Conn., have secured this week another large contract from the United States Government for their cold rolled "Swedish" steel, which is being used for some very severe stamped and drawn work that the Government have been making for some time. This steel is something quite new for such work and has been submitted to some very severe competitive tests.

The repairs to the furnace of the Spathe Iron Company, situated at Florence, Ala., are nearly completed, and the furnace will blow in about August 14.

The nail factory and rolling mill of the Brooke Iron Company, at Birdsboro, Pa., has resumed after a suspension of three weeks.

The blast furnace employees of the Junction Iron Company, at Mingo Junction, Ohio, have decided not to accept the 10 per cent. reduction recently announced by the company.

An execution for \$40,000 has been issued against Wm. M. Kaufman & Co., operating the Sheridan furnaces, at Sheridan, Lebanon County, Pa., at the instance of the estate of Jacob Mohr of Adamstown. The firm are composed of ex-Senator Wm. M. Kaufman of Reading; Z. M. Kaufman, the general manager at Sheridan, and E. Burd Grubb of New Jersey. There is a possibility that the matter will be adjusted, so as to take the property out of the hands of the sheriff and continue the furnaces in operation.

The Apollo Iron & Steel Company, Apollo, Pa., have closed down their sheet and bar mill indefinitely.

The Ellis & Lessig Steel & Iron Company, Limited, of Pottstown, Pa., have instructed the superintendents of the different departments to employ no Hungarians or other foreigners, and to give preference to men who have families.

The charcoal furnace of the Catoclin Mountain Iron Company, near Mechanics-town, Md., is again in blast.

The receivers of the American Tube & Iron Company, Middletown, Pa., and Youngstown, Ohio, have posted a notice announcing a reduction in wages and salaries of all officers, clerks, foremen and employees, approximating 10 per cent.

Cumberland Furnace of the Southern Iron Company, situated at Cumberland Furnace P. O., Dickson County, Tenn., is again in operation, after a shut down of a few weeks occasioned by repairs to the engine.

The Spring Lake Iron Company have banked their furnace at Fruitport, Mich. Operations will be resumed whenever the general business situation justifies it.

The nail department of the Norton Iron Works, Ashland, Ky., has resumed, after being closed down about two months.

Last week several conferences were held between Phillips, Nimick & Co., operating the Sligo Rolling Mills, at Pittsburgh, and a committee of the Amalgamated Association, at which the new scale was discussed. It is understood that this firm are desirous of starting up their works and have agreed to accept the scale for the puddling department, but insist that in their finishing de-

partments they be granted the same scale allowed to Jones & Laughlins, Limited. As yet no agreement has been reached, but it is probable that a settlement will be arrived at before this week is out.

A portion of the plant of Singer, Nimick & Co., Limited, at Pittsburgh, has been put in operation.

A meeting of the blast-furnace operators of the Mahoning and Shenango valleys was held in Youngstown, Ohio, on Saturday, the 5th inst., at which it was decided to reduce the wages of blast-furnace employees from 15 to 20 per cent. The scale agreed upon is the same scale as was in force in 1886. It provides that bottom fillers and helpers be paid \$1.35 per day; keepers, \$1.60; top fillers, \$1.50; laborers, \$1.15, and other labor in proportion. Notices were posted at all the furnaces now in operation, notifying the employees that the above reduction would go into effect on Tuesday, the 15th inst.

On Saturday, the 5th inst., the lap mills of the National Tube Works Company, McKeesport, Pa., and the departments connected with them were closed down indefinitely. The above action is the result of a meeting of the stockholders of the National Tube Works Company held in Boston, Mass., last week. This is the first time in the history of the above firm that they have been compelled to close down their plant in all departments on account of lack of orders.

The works of the American Sheet Iron Company, at Phillipsburg, N. J., have started up after an idleness of nearly two months.

The blacksmith shop, boiler shop, and a portion of the new hammer shop of the Cleveland Rolling Mill, Cleveland, Ohio, have been destroyed by fire, the loss amounting to about \$5000.

The management of the Irondale Rolling Mills, Anderson, Ind., have offered to resume operations providing the employees will consent to a 10 per cent. reduction in wages for 60 days. The offer was declined, the men claiming that they must stand by union prices.

The blast furnace of the Ohio Iron Company, at Zanesville, Ohio, manufacturers of pig iron, bar iron and steel, is ready for operation, but will not be started up for some time yet. The finishing departments of the plant of the above concern are in operation.

The Lackawanna Steel & Iron Company of Scranton, Pa., have ordered another furnace to be blown out, leaving only one of five in operation.

#### Machinery.

Wm. Tod & Co., Youngstown, Ohio, have recently made shipment of a blooming mill engine to the Durango Iron & Steel Company, Durango, Mexico. The same firm are also building two blooming mill engines for the new Bessemer plant of the Youngstown Steel Company, at Youngstown, Ohio.

The Lodge & Davis Machine Tool Company of Cincinnati, Ohio, announce that for the purpose of raising spot cash they will sell at auction in Chicago, on Wednesday, September 6, 1893, at 10 a.m., without reserve, to the highest bidder, their entire stock of new and second-hand machine tools, amounting to \$113,750, the sale to take place at the Chicago store, 78 and 70 South Canal street, and will consist of a complete line of their standard engine lathes, iron planers, shapers, upright and radial drills, milling machines, bolt cutters, monitor lathes, screw machines and brass-working machinery. In addition to the Chicago stock they will at once begin shipping from their warehouses at Cincinnati and elsewhere.

The Columbian Steam Pump Company, doing business at 7 and 9 South Jefferson street, Chicago, made a voluntary assignment in the County Court, on the 31st ult. Frederick P. Taylor was made assignee. The assets are stated at \$15,000 and liabilities at \$7000.

The Schoen Mfg. Company of Pittsburgh, with works in Allegheny, Pa., have entered in New York a judgment for \$12,762 against the Duplex Street Railway Track Company, the headquarters of which are at 51 Wall street. The money is claimed to be due for street railway track chairs furnished to the defendants by the plaintiffs.

The Union Switch & Signal Company, with works at Swissvale, Pa., have suspended 125 men for an indefinite period,

owing to the fact that considerable difficulty is being experienced in making collections. The firm have plenty of work on hand, and recently received a large order for interlocking machinery from the New York Central Railway Company.

The pattern makers, blacksmiths and machinists, about 100 in number, employed in the hydraulic works of Henry R. Worthington Company, South Brooklyn, N. Y., have struck because of a reduction of 10 per cent. in wages. About 260 men employed in the foundry connected with the pump works of the Worthington Company, at Elizabethport, N. J., have also gone out for the same reason. As a result the foundry at Elizabethport has been shut down for an indefinite period, and the Brooklyn works may also be closed. The company found it necessary, owing to the stringency of the money market, to curtail expenses, but found their workmen unwilling to share with them the burdens imposed by hard times.

The Goulds & Caldwell Company, who confessed judgment in the Superior Court, at Chicago, on the 29th ult. for \$20,000 in favor of the National Bank of America, entered the following confessions in the Circuit Court on the 31st ult.: In favor of the Lunkenheimer Company, \$3442.63; National Tube Works Company, \$1350; Western Tube Company, \$7300, and Gould Mfg. Company, \$24,300.

The Courtright Hydraulic Machinery Company, Room 331 Rookery Building, Chicago, filed a deed of assignment on the 31st ult., Charles H. Howard being named as assignee. The assignment was preceded by a confession of judgment in favor of Emil Rudert for \$19,040. Charles G. Davis is the president of the company and Frank G. Langley secretary and treasurer. The officers of the company attribute the assignment to the refusal on the part of the city to accept the new pumps at Bridgeport which have been put in by the company under contract. Attorney H. A. Hickman, who represents the assignee for the corporation, said: "The company have \$100,000 tied up in the transaction, and they were forced to suspend because the city has not fulfilled its agreement." The matter is yet in the hands of Corporation Counsel Kraus and no settlement has been made, though it is reported the city will refuse to accept the work done under the contract.

Cooper, Roberts & Co.'s foundry and machine shops, at Mount Vernon, Ohio, have been destroyed by fire. The loss is estimated at \$50,000; insurance, \$21,000.

The Malleable Iron Works plant, which was burned at South Milwaukee, Wis., recently, will be rebuilt as soon as the insurance is adjusted and the debris can be cleared from the site.

About 120 of the employees of the Smead Foundry, at Toledo, Ohio, struck because the company were three days behind with their pay.

Russell & Co. of Massillon, Ohio, manufacturers of agricultural implements and of engines, have decided to shut down their works about the middle of August for an indefinite period. About 1000 men will be rendered idle.

The Coulter & McKenzie Machine Company of Bridgeport, Conn., have purchased the plant of the Bridgeport Boiler Works, and will continue the same in operation.

The Pennsylvania Railroad Company have begun the erection of extensive repair shops at Washington, D. C. The main structure will be 170 x 161 feet in size, constructed of corrugated iron, and will admit of 32 cars being repaired at one time. A boiler shop and several smaller structures essential to a complete railroad repair plant will be erected at an early date.

The Interchangeable Tool Company will locate at Utica, N. Y., and have obtained land upon which to erect a plant. A factory 200 feet long and 50 feet wide will be built. They will be in operation by January 1, 1894, and about 150 men will be employed.

The truck business of the Howe Scale Company of Rutland, Vt., is very good. They are receiving large orders for them, as well as their improved jacks and letter presses. The conveyor business recently introduced promises well. Several large orders for conveyors have been received.

The Yale & Towne Mfg. Company of Stamford, Conn., have announced that a reduction in wages of 10 per cent. will take effect August 15. The works will be operated in full, and probably none of the 1000 employees of the company will be laid off.

The molding department and machine shop of the Coleman Hardware Company, Morris, Ill., have been closed for an indefinite time, throwing 100 men out of employment.

Ground has been broken at Olneyville, R. I., for the new plant of the Diamond Machine Company. The building will be of brick, 140 x 60 feet in size and three stories high.

The boiler makers of Bay City, Mich., have made a formal demand for nine hours of work with ten hours' pay. The demand has been refused, and all the shops are closed.

The Cleveland Foundry Company of Cleveland, Ohio, have resumed work after a vacation of two weeks. Over 200 men are at work, and this force will be increased from time to time as circumstances may require.

A company has been organized at Springfield, Ohio, by local parties for the manufacture of drills, lathes, planers, &c. The company will be incorporated as the Owen Machine Tool Company, with a capital of \$25,000.

The 200 men employed in the rolling and steel melting departments of Henry Disston & Sons' saw works, at Tacony, Philadelphia, have been laid off on account of the dullness in trade. A large number of men had previously been discharged.

The Hoggson & Pettis Mfg. Company of New Haven, Conn., manufacturers of chucks, have announced that for the present their works will be operated but four days a week. Many of the employees have been discharged.

On Saturday, the 5th inst., 200 more employees of the Westinghouse Air Brake Company, at Wilmerding, Pa., were suspended for an indefinite period on account of lack of orders. Unless there is an improvement in this respect in the near future it is likely that the entire works of this concern will be closed down at an early date.

The Athol Machine Company of Athol, Mass., have shut down for two weeks.

Some notable improvements and additions to equipment have recently been made at the plant of the Totten & Hogg Iron & Steel Foundry Company, at Pittsburgh. Included in the additions to equipment may be mentioned one large planer with 72-inch bed and 18 feet in length, furnished by the L. W. Pond Machine Tool Company of Worcester, Mass. The roll lathes have all been overhauled and a number of new ones added of various sizes. All cranes, both in the machine shop and foundry, have recently been fitted up with steam power, which greatly facilitates the handling of material. The machine shop department has been rebuilt, while a large addition has been made to the foundry, into which has been put a new engine and boiler. In fact, the entire plant of this firm has been thoroughly overhauled and improved, and with the introduction of new machinery and methods, they are better prepared than ever before to meet the wants of the trade for rolling-mill machinery of various kinds. This firm have just taken up the manufacture of the Aetna rolling mill engine, formerly made at the works of the Aetna Machine Company, at Warren, Ohio. This engine is claimed to be very heavily equipped and is provided with the Freeman valve, which is said to be absolutely balanced at any position of the stroke. The firm are just completing an engine of this type for the Durango Iron & Steel Company, Durango, Mexico, and it will be shipped in a short time. It is 26 x 48 inches in size, and is designed especially for doing heavy rolling-mill work. Up to date this firm have shipped about five carloads of machinery of various kinds to the Durango Iron & Steel Company, and when present contracts are completed will have shipped two or three carloads more. For about a year and a half the works of the firm have been operated night and day, and they still have a good many old orders on hand, and are also receiving their share of new work.

#### Miscellaneous.

The Ohio Coal & Coke Company, recently organized at Youngstown, Ohio, have opened an office in that city under the management of Chas. S. Hull.

A dispatch from Detroit states that on account of the prevailing financial stringency more than 1500 men have been laid off at the two plants of the Michigan Peninsular Car Company. Last week a reduc-

tion of the men who were retained became necessary, and each of the 700 men now at work has had his pay cut from 10 to 15 per cent. After September 1 both plants will probably shut down for a month or longer.

The National Vapor Stove Company of Cleveland, Ohio, have made an assignment for the benefit of their creditors. The factory of the company is at Lorain, Ohio, and their principal office at Cleveland, while the company are incorporated under the laws of Michigan. The assets, plant and all are estimated at \$125,000, and the liabilities at \$90,000.

Andrew J. Kauffman of Columbia, Pa., has filed a bill in equity in the United States District Court against the Chestnut Hill Iron Ore Company of Columbia, alleging their insolvency and asking for the appointment of a receiver. The defendant company admitted the averments in the bill and the court appointed Stephen S. Palmer of New York receiver, requiring him to give bond in the sum of \$200,000 within ten days.

Forty workmen at the Morewood Tin-Plate Works, Elizabethport, N. Y., struck on account of low wages, leaving the plant so badly crippled that it may have to shut down.

The Singer Mfg. Company of Elizabethport, N. J., have discharged over 500 hands during the past week.

The Washburn Brass & Iron Works of Yonkers, N. Y., have reduced the wages of their 115 employees 10 per cent., because the company say it is impossible to secure orders without going considerably under former prices. The reduction has been accepted by the men.

The Vienna Enamel & Stamping Works, at Chesterton, Ind., have shut down indefinitely, throwing 150 men out of employment.

The locomotive shops of the New York, Lake Erie & Western Railroad, at Susquehanna, Pa., will run only 24 hours per week until further notice.

Notices have been posted in the car repair shops of the New York, New Haven & Hartford Railroad, at Hartford, Conn., announcing a reduction of hours of labor of all workmen to eight hours per day. About 250 men are affected.

At the Brooks Locomotive Works, Dunkirk, N. Y., about 200 men have been laid off on account of a falling off in work.

The United States Radiator Company of Loyalhanna township, Westmoreland County, Pa., have been chartered, with a capital stock of \$50,000, and will begin the manufacture of radiators and steam heaters about September 1. The concern are substantially a branch of the Pittsburgh Heating & Supply Company of Greensburg, Pa., but will be operated under separate management.

Sidney Shepard & Co., extensive manufacturers of stamped ware at Buffalo, N. Y., have reduced their working force one-half. When running full 400 men are employed.

The 300 workmen in the Richmond & Danville Railroad shops, at Atlanta, Ga., are now working only five hours a day, or one-half the number of hours formerly worked, with a corresponding cut in wages.

The employees in the rule department of the Stanley Rule & Level Company, at New Britain, Conn., have been discharged, and that department will remain idle for an indefinite period.

The American Saw Company of Trenton, N. J., have shut down their factory for an indefinite period. About 100 skilled workmen are affected.

After a month's shut down the factory of Craighead & Kintz, manufacturers of lamp fixtures, &c., at Ballardvale, Mass., has resumed operations with 100 men, half the regular force.

The cutlery department of the Humason & Beckley factory, at New Britain, Conn., has closed down for two weeks.

The employees of the Eastern Tinware Company of Portland, Conn., have struck on account of a reduction in wages. The works are now idle.

The Coil Wire Belting Company of Greenville, N. J., have shut down their factory on account of lack of business.

The 500 employees of the Central Stamping Company, Brooklyn, N. Y., have been placed on half time.

The officers of the Baldwin Locomotive Works, Philadelphia, deny that any large number of men have been laid off, but say

that a gradual reduction of the working force is probable.

Springfield, Mass., capitalists have organized the New England Advertising & Stamp Machine Company, incorporated under the laws of Maine, with a capital of \$250,000, to introduce throughout New England the new stamp machine.

## Trade Publications.

THE LIDGERWOOD MFG. COMPANY, 96 Liberty street, New York, have issued the sixth of their series of sketch books. It bears the title "Cableway Sketches," and contains 64 pages of information regarding cableways, illustrated by a large number of pen and ink sketches and half-tone engravings. A portion of the matter contained in the last sketch book, "Open Pit Mining," is reproduced in "Cableway Sketches," treating as it does of a very important branch of cableway service. With this exception the pamphlet is wholly devoted to the construction of dams and the operation of quarries using the Lidgerwood cableways. The Sodam, Austin, Butte City and Coosa dams are illustrated, different stages of their construction being shown. Several views are also printed illustrating the great advantage of the cableway for stripping quarries as well as for general quarry use. The longest cableway ever sold for quarrying was 1200-foot span, load 10 tons. The heaviest weight handled up to the present time is 12 tons on an 800-foot span.

**Electric Cementation of Steel.**—The influence of electricity on the cementation of steel seems likely to throw light on the physics of the process. M. Jules Garnier has recently published the results of his first experiments in this direction, in which a current of electricity was made to form a circuit with the carbon packing as anode and the iron to be hardened the cathode. Both the metal bar and the carbon were inclosed in a tube, which was placed horizontally in a small reverberatory furnace and heated during the experiment, his idea being that the heat would determine the mobility of the carbon, while the electric current would determine the direction of motion of the carbon atoms. The minimum voltage to overcome the resistance was employed, and in one experiment the conditions were 7 volts 35 amperes and 3 hours at a temperature from 900° C. to 1000° C. After the experiment the bar was examined and the cementation was found to have penetrated to a depth of 10 mm. In a second experiment two bars of metal formed the two electrodes, and were separated by a carbon packing of about 10 mm. In this case, with a current of 55 amperes, at a pressure of 2.5 volts, after three hours' heating, the anode bar remained unchanged, while the cathode was hardened to a considerable extent on the side opposed to the anode. It suggested that the cathode should be rotated during the process, and thus secure a uniform action. The rapidity of the process should more than compensate for the cost of the electrical plant, if future experiments confirm these results.

A new instrument has been constructed under the auspices of the German Government Telephone Department, by which it is intended to control the duration of telephonic conversations and to measure the time occupied. It is called a telephonometer, and registers automatically the time of each conversation from the time of ringing up of the exchange to the ringing off signal. By this means it will be possible to reduce the rentals of telephones to a scale according to the service, instead of a fixed charge to a constant or desultory user alike.



# TRADE REPORT

The enormous restriction of business is well reflected in the returns of the blast-furnace capacity active on the first of this month, when the weekly production had fallen to 107,042 tons per week, or 67,000 tons below the record of June 1. Since the beginning of the month additional stoppages have taken place, and we are probably now not running much above 100,000 tons per week, against 180,000 to 185,000 tons, which is the record in active times.

Violent as has been this movement, it is doubtful whether in certain branches the decline in production has not been even greater. It is probably the case with the Steel works west of the Allegheny Mountains.

There are indications that in some branches the falling off in production is beginning to tell on the tone of the markets. Bars in the West show a trifle for firmness, and assortments are beginning to be irregular.

In Pig Iron, in Chicago, some considerable buying has been done, although the feature of it has been that sellers have been willing to contract for long delivery at prices now ruling. They do not, therefore, take a hopeful view of the future.

In all lines ready money can command its own basis of settlement, but, unfortunately, cash customers are very scarce now.

While a larger volume of business is confidently looked forward to at an early date, the conviction is gaining ground that it will take a long time to get over the havoc created during the past three months, and that the profits of the balance of the current year will contribute very little toward repairing shattered fortunes. Far-sighted business men fear that before the industry has recovered from the effects of the financial cyclone it may suffer renewed blows through tariff agitation. A long period of low values is looked forward to, even if financial affairs improve steadily from now on, which is the best hoped for.

Transactions of magnitude are so rare nowadays that little opportunity is afforded to report concerning prices and sacrifice sales practically monopolize the markets. Under the circumstances, quotations are nominal, and are only the starting point for negotiations.

One point seems to be brought out very rarely, and that is that accounts are being steadily reduced, and that, therefore, the amounts due for merchandise must be liquidating quite rapidly, while no new engagements are being entered into.

## Chicago.

(By Telegraph.)

Office of *The Iron Age*, 59 Dearborn street.  
CHICAGO, August 9, 1893.

Nothing of an encouraging nature happens these days. Reports on every side are steadily showing decreasing business and greater financial distress. There is a lack of even hopeful talk. The best that can be said of the situation is to quote the words of a leading manufacturer here that each day surely brings us one day nearer the end of the financial trouble. The assignment of the East Chicago Iron & Steel Company, which occurred on Monday, was entirely unexpected, as the company were believed to be able to weather the storm. They have gone down now simply because they were unable to raise money at an hour's notice to satisfy an importunate creditor. Their assets are very largely in excess of their liabilities. They have no bonded indebtedness on their plant, so that they are in a good position to arrange for an extension and will probably resume operations at an early day.

**Pig Iron.**—A better inquiry is coming in from the country trade, and there is good ground for the belief that a great deal of Iron will be bought in the near future. This applies to local as well as Southern Irons. Some of the large near-by consumers of Southern Coke suddenly decided not to wait any longer, and last week bought as much of their season's supply as they could place under contract. They desired deliveries scattered over the next 12 months, but sellers were not willing to do this at present prices, and consequently the deliveries made only cover the remainder of the year. The negotiations in these cases developed the fact that if Southern furnace companies would sell at current rates for very long deliveries, quite a number of other consumers were ready to place fair contracts. It would appear from this that the bottom has not completely dropped out of the Iron trade. The local situation is such as to satisfy the most pessimistic. There is not a single furnace in this vicinity producing Foundry Pig at present, and the shipments from stock are not sufficiently heavy to make great inroads on the quantity piled up at furnaces. The situation in Lake Superior Charcoal is peculiar. All the furnaces are out of blast except one or two stacks, and the stocks on hand at many of these furnaces are covered by contracts for future delivery, placed some time ago. Recent inquiries for Charcoal Iron have awakened consumers to the fact that but a limited quantity is available for future delivery during the latter half of the year. Should trade in this direction receive any stimulus it would seem that a sharp advance in Charcoal Iron is in order. The following quotations are subject to concessions for prompt cash and immediate shipment. We quote as follows:

Lake Superior Charcoal.....	\$16.00 @	\$16.25
Local Coke Foundry, No. 1....	13.50 @	14.00
Local Coke Foundry, No. 2....	12.75 @	13.00
Local Coke Foundry, No. 3....	12.50 @	12.75
Local Scotch.....	14.00 @	15.00
Ohio Strong Softeners.....	15.75 @	16.25
Southern Silvery, No. 1.....	@	14.50
Southern Silvery, No. 2.....	@	14.00
Southern Coke, No. 2.....	12.60 @	12.85
Southern Coke, No. 3.....	12.10 @	12.25
Southern, No. 1, Soft.....	12.60 @	12.85
Southern, No. 2, Soft.....	12.00 @	12.25
Southern Gray Forge.....	11.50 @	12.00
Tennessee Charcoal, No. 1....	16.00 @	16.50
Alabama Car Wheel.....	@	18.35
Coke Bessemer.....	14.50 @	15.00
Hooking Valley, No. 1.....	15.25 @	15.50
Jackson County Silvery.....	16.50 @	17.00

**Bars.**—The demand continues for small lots for quick delivery. Stocks in this vicinity are still being drawn from steadily to supply the needs of large consumers while rolling mills are shut down. The demand in this way makes the small trade a little more animated, but the usual heavy business in Bar Iron, as well as Soft Steel Bars, is almost suspended. No further season contracts are known to have been placed since our last report. Prices continue about as previously quoted at 1.45¢, Chicago, half extras, for mill lots of Bar Iron up to 1.50¢ for single carloads, and 1.65¢ for small lots of Soft Steel Bars. Trade is in such condition now that there appears to be little contention over prices. The mills are insisting on prompt cash, and are more anxious about the financial standing of the purchasers than they are about the quantity they sell. Small lots from stock are unchanged at 1.70¢ @ 1.75¢ for Iron or Soft Steel.

**Other Manufactured Iron and Steel.**—The demand for Beams and other Building Material is confined to small lots only, but the dealers who have yards here report that they are kept quite busy in cutting to lengths to meet the demand from builders. Considerable business is coming in from small Government buildings and other public buildings in Western cities. The demand for mill shipment is exceedingly light, as the large operations are either all under contract or have been withdrawn from the market for the present. Suspension of the mills has caused some purchasing from one another to get needed sizes. The Plate trade is extremely quiet, with nothing doing except in a small way from stock. The movement in Light Sheets and Galvanized Iron is confined to very small quantities only. Nothing new has developed in Merchant Steel. Prices of mill shipments, Chicago delivery, may be quoted as follows: Beams, 1.80¢ @ 1.90¢; Tees, 1.95¢ @ 2.05¢; Angles and Universal Plates, 1.75¢ @ 1.80¢; Tank Steel, 1.75¢ @ 1.85¢; Shell Steel, 2.05¢ @ 2.15¢; Flange Steel, 2.20¢ @ 2.30¢; High Grade Fire Box, 2.75¢ @ 5¢; No. 27 Common Black Sheets, 2.83¢; Juniata, Galvanized Iron, 70 and 10 and 5 % discount; Sheet Copper, 30 and 35 % off according to quantity; Smooth Finished Machinery Steel, 1.90¢ @ 2¢; Open-Hearth Spring and Smooth Finished Tire, 2¢ @ 2.10¢; Iron Finished Steel Tire, 1.70¢; Ordinary Tool Steel, 6¢ @ 7¢; Special Tool Steel, 12¢ and upward.

**Rails and Track Supplies.**—The Steel Rail trade is very dull, with prices quoted at \$30 @ \$32, according to quantity. Splice Bars are unchanged at 1.60¢ @ 1.65¢; Track Bolts with Nuts, 2.55¢ @ 2.60¢; Spikes, 1.85¢ @ 1.95¢.

**Old Rails and Car Wheels.**—Large lots of Old Iron Rails are now offered for sale by the holders, but dealers are disinclined to make any investments or to do any speculation in this line. The best price offered by consumers is now \$14, and even at this rate purchasers would not be willing to pay cash, but would insist upon making a trade by which they could dispose of some Finished Material in part payment for Old Material. Nothing has occurred in Old Steel Rails to fix prices, and we repeat nominal quotations at \$9.25 for short pieces and \$13 for long lengths. Old Car Wheels are completely stagnated; at the last sale reported at \$14.

**Scrap.**—There is an absence of buyers in this market, while plenty of Scrap

is being offered by the railroads and other holders. The following quotations as nearly represent the market as possible: No. 1 Forge, \$10.50; No. 1 Mill, \$8; Sheet Iron, \$5; Pipes and Flues, \$7.75; Axles, \$18; Horseshoes, \$12; Fish Plates, \$14.50; Spikes and Bolts, \$12.50; Cast Borings, \$5.25; Wrought Turnings, \$7.25; Axle Turnings, \$9; Heavy Cast, \$9.50; Stove Plate, \$8; Malleable Cast, \$8; Mixed Steel, \$9, gross ton; Leaf Steel, \$16.

**Metals**—Lake Copper is now down to 10.50¢ for carload lots, while casting Copper is quoted at 10¢. Spelter is offered at 3.75¢, carload lots. These prices can be shaded for spot cash.

## Philadelphia.

Office of *The Iron Age*, 220 South Fourth St.,  
PHILADELPHIA, Pa., August 8, 1893.

The condition of business in Iron and Steel is about the same as reported in our last. There is a little more inquiry in some lines, but nothing to show that any marked improvement need be expected in the near future. Things are indeed so much out of joint that it will take a long time for them to resume their normal condition. Work is scarce in every department, and a stop in one affects other branches almost indefinitely. At the present time there is no exception to the general prostration, but in all cases the cause is the same, viz.: loss of confidence and scarcity of money. These may be temporary influences, but it is no easy matter to see the way out of the difficulty, except in the usual way—exhaustion, and then the natural reaction. At this writing it is impossible to form any idea what the next turn in affairs may be. Some people are sanguine enough to believe that the action of Congress will give things a start, and possibly it may, but the root of the evil is beyond the reach of legislative action, and will, therefore, have to find its remedy in other directions. Congress cannot cure overproduction, and apart from the financial problem, manufacturing interests have been drifting into bad condition for a long time past. There is a limit to the capacity for absorption even in a rich country like this, and there can be little room to doubt that things have been overdone, and in such cases there is no escape from the legitimate results. The country will grow up to its present excess of capacity after awhile, but it will take time to do it, and those who are looking for any marked improvement as the result of Congressional action will probably be disappointed.

**Pig Iron.**—There is no market of any account, transactions being confined to small lots to cover temporary requirements. In such cases prices are about in line with the figures named below, but in larger lots, or in forced sales, new elements have to be considered, which makes quotations an entirely different matter. Spot cash, for instance, is a very potent factor in times like these; quality and quantity are also of more importance than in ordinary times, so that each transaction is, in a pressure, "a law unto itself." It cannot be said that there is any extraordinary measure to realize, but there is full and plenty, and those with ready cash can find plenty of bargains around. The falling off in consumption has been heavy enough to more than offset the decrease in production, so that even if things get better it will take time to stiffen prices. But there is nothing seriously wrong in the Pig Iron situation. Any-

thing like a fair demand would easily absorb the present supply, and there is no reason to suppose that it will be delayed very much longer. Great activity is not expected, but with such a sharp curtailment of production as there has been it is probable that supply and demand are not greatly out of proportion. For the present, however, sales are made in small lots at about the following prices for Philadelphia delivery or its equivalent:

American Scotch, No. 1X...	\$16.00	@	....
American Scotch, No. 2X...	15.00	@	....
Standard Penna. (Lake Ore), No. 1x.....	14.75	@	\$15.25
Standard Penna. (Lake Ore), No. 2x.....	14.00	@	14.50
Standard Virginia, No. 1x...	14.80	@	14.75
Standard Virginia, No. 2x...	13.75	@	14.00
Virginia and Southern, No. 1x, Soft.....	14.00	@	14.25
Virginia and Southern, No. 2x, Soft.....	13.00	@	13.25
Standard Penna. and Virginia Forge.....	13.00	@	13.25
Ordinary Forge.....	12.50	@	12.75

### Bessemer and Low Phosphorus.

Business is at an extremely low ebb, there being little or no demand, and almost as small supply. The Norristown Furnace is making Low Phosphorus, and as there is practically no competition, the product is distributed around in small lots at about last week's prices, but no large lots could be sold unless at serious reductions from quoted rates, which are \$15.50 @ \$16, delivered, for Bessemer, and from that to \$16.50 for extra quality, and \$18 @ \$18.50 for Low Phosphorus.

**Steel Billets.**—It is a monotonous condition of affairs to have to report nominal prices week after week, and no actual sales. This, however, very nearly represents the situation to day. There are inquiries for small lots on which sellers quote about \$24, delivered, while Western Steel in 500-ton lots and upward could be had at about \$23.25. But consumption is so light, and prices of the product so unsatisfactory, that it is difficult to draw out a bid for a good-sized lot, the general disposition being to wait for some definite movement before entering into new engagements.

**Muck Bars.**—Sellers quote \$22.50 @ \$23, delivered, but there is no demand, so that prices are purely nominal.

**Bars.**—Nothing but a small hand-to-mouth business can be reported, and at the same low prices as heretofore quoted, say 1.60¢ to 1.65¢ for best quality, city delivery, or 1.50¢ to 1.55¢ at interior points. There is nothing in prospect likely to bring any decided improvement, and it looks as though the mills would have a hard time during the fall months. Steel Bars are quoted at 1.50¢ @ 1.75¢, according to requirements as to quality, &c.

**Skelp.**—Nominal prices are 1.50¢ @ 1.55¢, delivered, for Grooved, and 1.60¢ @ 1.65¢ for Sheared, but there is very little business offering that manufacturers feel warranted in accepting.

**Plates.**—A dull and unsatisfactory market must be the record for the past week. Large orders can hardly be expected in times like these, but even small orders are not as frequent as could be desired. Prices under such circumstances are naturally weak and depressed, and a lower point has been reached than anything recorded up to this date. Tank Steel at 1.60¢, delivered, and Shell at very little over 1.75¢ on a 400 ton order is something unprecedented, but business on these terms was accepted a few days ago, with plenty of competitors at a very small fraction over these figures. The supply of orders is very limited, however, and

with so many mills competing for work it is not surprising that prices are slaughtered. On small lots quotations are about as follows:

	Iron.	Steel.
Tank Plates.....	1.80 @ 1.85¢	1.70 @ 1.75¢
Bridge Plates.....	1.75	@ 1.80¢
Shell.....	1.90	@ 2.10¢
Flange.....	2.70 @ 2.90¢	2.20 @ 2.40¢
Fire Box.....	3.00 @ 4.00¢	2.50 @ 2.70¢
Special qualities.....	3.25	@ 3.75¢

**Structural Material.**—There is no demand of any account, but mills all have more or less work on old contracts, which, however, are gradually drawing to completion. Prices are weak, and on the right kind of orders liberal concessions would be granted. Small lots are quoted about as follows: Beams, Channels or Tees, 1.80¢ @ 2¢, according to size of order; Angles, 1.75¢ @ 1.80¢; Universal Plates, 1.70¢ @ 1.75¢.

**Sheets.**—Business, as in other departments, is slow and unsatisfactory, but mills are at work in anticipation that most of the stock will be required before the close of the season. Prices are very low, however, Western Sheets being offered in quantity at rates which most Eastern mills are unwilling to meet, but for best makes small lots command prices about as follows:

Best Refined, Nos. 14 to 20....	2.75¢ @ 2.85¢
Best Refined, Nos. 21 to 24....	2.90¢ @ 3.00¢
Best Refined, Nos. 25 to 26....	3.15¢ @ 3.20¢
Best Refined, No. 27.....	3.30¢ @ 3.40¢
Best Refined, No. 28.....	3.40¢ @ 3.50¢
Common, ¼¢ less than the above.	

Quotations given as follows are for the best Open-Hearth Steel, ordinary Bessemer being ¼¢ @ ½¢ lower than above named:

Best Soft Steel, Nos. 14 to 16....	2½¢ @ 2½¢
Best Soft Steel, Nos. 18 to 20....	2½¢ @ 3¢
Best Soft Steel, Nos. 21 to 24....	3¢ @ 3½¢
Best Soft Steel, Nos. 25 to 26....	3½¢ @ 3½¢
Best Soft Steel, Nos. 27 to 28....	3½¢ @ 3½¢
Best Bloom Sheets, ¼¢ extra over the above prices.	
Best Bloom, Galvanized, dis.....	70 and 5 %
	@ 70 and 10 %

**Old Material.**—The situation shows but little change from last week. Cash buyers are scarce, and as any other terms are not satisfactory to sellers, very little business is being done. Asking prices are about as follows: Old Iron Rails, \$16 @ \$16.50, delivered; Old Street Rails, \$18 @ \$19; Old Steel Rails, \$13.50 @ \$14; No. 1 Railroad Scrap, \$13 @ \$14, delivered; \$7 @ \$8 for clean new No. 2 Light Scrap; \$11 @ \$12 for Machinery Scrap; \$10 @ \$11 for Wrought Turnings; \$7 for Cast Borings, and \$13 for Old Car Wheels.

## Cincinnati.

(By Telegraph.)

Office of *The Iron Age*, Fifth and Main Sts.,  
CINCINNATI, August 9, 1893.

There is no improvement in the Pig Iron market, the depressed financial situation dominates the trade and in some respects this is worse than ever. There is little more than a single car lot demand, and while the offerings are not large, they are abundant for the wants of the trade. There have been some sales of Southern Charcoal Iron, about 2000 tons for cash, and while the price was not made public, it may be readily surmised that it was much below quotations, as it is well known that cash buyers can obtain Iron almost at their own prices. There is some inquiry for Pig Iron for delivery the first three or four months in next year, but sellers are not disposed to make such long contracts, even if they can obtain a moderate advance on quotations for-

immediate delivery, their theory being that they will either not be making Iron then or that they will be able to obtain at least a reasonable profit for it, which they cannot do now. The sales of Iron to be consumed in this district have been the smallest of any week this season, and they have been only moderately supplemented by some sales for the North and East. We quote as follows:

**Foundry.**

Southern Coke, No. 1	12.75 @ \$13.00
Southern Coke, No. 2	11.25 @ 11.50
Southern Coke, No. 3	10.75 @ 11.00
Ohio Soft Stone Coal, No. 1	15.50 @ 16.00
Ohio Soft Stone Coal, No. 2	14.50 @ 14.75
Lake Superior Coke No. 1	15.00 @ 15.25
Lake Superior Coke No. 2	14.00 @ 14.25
Hanging Rock Charcoal, No. 1	18.50 @ 19.00
Hanging Rock Charcoal, No. 2	17.50 @ 18.00
Tennessee and Alabama Charcoal, No. 1	14.75 @ 15.00
Tennessee and Alabama Charcoal, No. 2	13.75 @ 14.00

**Forge.**

Gray Forge	10.25 @ 10.50
Mottled Coke	10.00 @ 10.25

**Car Wheel and Malleable Irons.**

Standard Southern Car Wheel	17.75 @ 18.00
Lake Superior Car Wheel and Malleable	17.25 @ 17.50

**St. Louis.**

(By Telegraph.)

Office of *The Iron Age*,  
Bank of Commerce Building,  
St. Louis, August 9, 1893.

**Pig Iron.**—Outside of the closing of a few orders for immediate delivery the market is without change. The shutting down of a large number of furnaces has withdrawn a considerable quantity of Iron from the market, among which is some that has been selling at prices that only helped to further demoralize the already weak market. There is no scarcity, however, or anything approaching it, but the furnaces that are still in blast are, generally speaking, classed among the stronger concerns, and are not looking for business at cut prices. The consumptive demand is remarkably light. At this writing the four stove concerns in St. Louis are all closed down, although one is getting ready to start up on the 10th. They have been closed down all the way from two weeks to two months, and as they are heavy consumers of Pig Iron their temporary withdrawal from the market has made itself felt in the sales columns. Consumers are not loading up at the low prices at present prevailing, simply because they cannot at this time see daylight ahead, and even if Iron was \$1 a ton lower sales would not show any perceptible increase. Cash customers are sending in four months' paper, and those who are closed down are asking that shipments of Iron already bought be withheld until business revives. So long as the present conditions continue any improvement is out of the question, and yet on the other hand there is hardly any possibility that prices will go lower, for the reason that prices cut little or no figure at the present time and, as above stated, the reduction of \$1 per ton would not induce any business whatever. Quotations are as follows, for cash, f.o.b. St. Louis:

Southern Coke, No. 1 Foundry	12.25 @ \$13.50
Southern Coke, No. 2 Foundry	11.75 @ 12.00
Southern Coke, No. 3 Foundry	11.25 @ 11.50
Southern Gray Forge	10.75 @ 11.00
Southern Car Wheel	18.00 @ 19.00
Lake Superior Car Wheel	16.75 @ 17.25
Ohio Softeners	15.75 @ 16.50
Missouri Charcoal, No. 1 Foundry	12.75 @ 13.25

**Bar Iron.**—There is no improvement to note either in the price or demand for Bar Iron. Mills are either closed down or running only on half time, and even under these conditions are stocking up their product. In the absence of sales prices are largely nominal, as follows: Lots from mill command 1.45¢ @ 1.47½¢, f.o.b. cars East St. Louis, according to the size of the order. Jobbers ask 1.60¢ for small lots from store.

**Barb Wire.**—The market for Barb Wire is in an unsettled condition and prices are weak with a downward tendency. A local mill which is closed down, and which is generally supposed to be carrying something like 400 tons of Barb Wire, are making low prices to close out their stock, but do not appear to be moving much of it. The general quotation for Painted is \$2, with Galvanized \$2.40, although for spot cash these prices would doubtless be shaded.

**Wire Nails.**—There is very little trade doing in Wire Nails, and \$1.50 for carload lots to jobbers seems to be about bottom. Mills are closed down, and the market is not overburdened with any large stocks, and as it will be about September 1 before mills resume, the present stocks are likely to be depleted at that time.

**Rails and Track Supplies.**—Absolute quietness prevails in this department, and Rails cannot be sold even at to-day's low prices. We quote \$30.50 @ \$31.50, according to quantity. Track Supplies are without change, either as regards price or demand. Splice Bars, 1.70¢; Spikes, 2¢; Bolts, Square Nuts, 2.50¢; with Hexagon Nuts, 2.60¢. Old Rails are quoted at \$16.

**Pig Lead.**—Business is confined to small lots, which are taken at from 3.05¢ to 3.10¢. Consumption continues to fall off and prices are weaker in consequence.

**Spelter.**—Offerings are made at 3.70¢, but find few buyers. Consumers of Spelter seem to have all they want, especially as they are only running half time, and there is practically no market.

**Boston.**

Office of *The Iron Age*, 146 Franklin St.,  
Boston, August 8, 1893.

Conservatism continues to reign in the Iron trade. The foundry people are not buying, through fear that there is to be a dull business for them the rest of the year. Machinists are not buying, because they cannot see the amount of business ahead that they should see. Builders are not buying for new work, for the reason that they have not the orders. At the same time production in Pig Iron is being shortened. Prominent dealers say that production is being lessened as much as the demand for consumption has fallen off. At the same time the singular lack of confidence continues.

**Pig Iron.**—New business in Pig Iron is very light. Dealers are delivering considerable Iron, bought previously, but this Iron is all that the foundry people appear to want. They are, in fact, anticipating a shutting down of their works for a longer period than the usual summer stopping for repairs. But they will continue to run if orders come in. In the manufacturing towns of New England the foundry people are anticipating a shut down for want of orders, but generally they have not yet reached

the end of their orders. The Southern furnaces continue to go out of blast, and they will not start up again till there is a better demand for Iron. The values of Iron are steady, with Southern Iron, ex-dock in Boston, quoted at: No. 1, \$15 @ \$15.50; No. 2, \$14 @ \$14.50; No. 3, \$13 @ \$14. Virginia Iron is in as good demand as any Iron in this market, with the quotations at \$15.50 for No. 1, and at \$14.25 @ \$14.50 for No. 2. Pennsylvania Iron continues quiet. It is reported that Pennsylvania furnaces are going out of blast, to some extent, and that production is being a good deal reduced. Quotations for Iron at shipping port are at: No. 1, \$14.50 @ \$15; No. 2, \$13.50 @ \$14; Gray Forge, \$13 @ \$13.50. Ohio Iron is in quiet demand here with a little coming in, and quoted at \$17 @ \$17.50 for Iron laid down in Boston.

**Bar Iron.**—The storekeepers complain of a very dull trade in Merchant Iron. Machinists are not buying, as mentioned above, and manufacturers are nearer to stopping their works than to buying large quantities of Iron. At the same time the New England rolling mills are running with some orders ahead. Ordinary Old Material Bars are still quoted at 1.60¢ @ 1.65¢ from mill; from store, 1.65¢ @ 1.70¢. Best Bars from puddled Iron are quoted at 1.80¢ @ 1.90¢ from mill; from store, 1.95¢ @ 2¼¢. Norway and Swedish Bars are dull, with the offerings yet small from store. Quotations are \$66 @ \$70 per ton for Bars and Shapes.

**Building Iron.**—Building Iron is extremely dull. A little business is being done in the way of materials for buildings in process of construction, and occasionally a few carloads of Beams, &c., are sold for a new structure, but these latter transactions are few. Agents from some of the largest mills in the country, now visiting here, say that they have never seen trade so dull. Notwithstanding that a good many of the mills are idle, those running are not able to get orders sufficient to keep them fully busy. They all want orders, and they are making slight concessions to get them, though quotations are nominally unchanged: Beams and Channels, from mill, 1.85¢ @ 1.95¢; from store, 2¼¢ @ 2½¢; Tees, 2.10¢ @ 2¼¢ from mill; from store, 2.40¢ @ 2.60¢; Angles, 1.80¢ @ 1.90¢ from mill; from store, 2¼¢ @ 2.35¢.

**Steel, Steel Plates and Steel Rails.**—Small buying is the rule in Merchant Steel, and in all Steel products. Machinists are very conservative buyers at this time, as well as manufacturers. Nominally prices are steady, and yet buyers of large lots get concessions. Bessemer Steel, 2¢ @ 2.10¢; Tire and Sleigh Shoe, 1.90¢ @ 2¢; Sheet, 2¼¢ @ 2½¢; American Cast, 6¼¢ @ 7¢; English Cast, 13½¢ @ 15¢; American Steel Rails, \$29 at mill. There is only a very small business in Steel Rails. Agents say that even the big New England roads are pleading poverty, a poor business, with the intention of putting off buying rails. Steel Plates are dull, but agents here are ostensibly holding to prices. Mills will shorten production a good deal more, rather than accept of lower prices, which, they say, would simply mean a loss to them. Quotations are unchanged at: Tank, 1.80¢ @ 1.90¢; Shell, 1.85¢ @ 1.95¢; Refined, 2.05¢ @ 2.12½¢; Fire Box, 2¼¢ @ 2½¢.

**Nails.**—The feature in the nail market is the advance in the price of Wire Nails. Prices are reported to be 15¢ higher. The jobbers are now quoting

at \$1.75  $\text{\textcircled{P}}$  keg. For Cut Nails the demand is still mentioned as "very fair for the season, and considering the condition of the building trade." Cut Nails, both Iron and Steel, are quoted at \$1.40  $\text{\textcircled{P}}$  keg for large lots and at \$1.45 @ \$1.50 for small lots.

**Pipes and Tubes.**—The feature in the Pipe market is the shutting down of the mills. Some are shutting down in part, others are working on reduced hours, and others closing altogether. Prominent dealers here, thoroughly acquainted with the trade, estimate that from 50 % to 60 % of the full production of the Pipe mills of the country is shut down to-day. This they estimate must mean a firm market when there is any business. Business is very quiet at present. Quotations, as per the Pipe card, are not changed. Some of the Boiler Tube mills are also shut down. The market here is very quiet, with the quotations at: 3-inch and over, 67½ % off from the list; 2½-inch and under, 65 % off.

**Scrap Iron.**—The market on Scrap Iron does not improve. The market on new material is too low for manufacturers to buy Scrap freely. No. 1 Wrought continues to be quoted at 50¢ @ 55¢, with Old Horseshoes and other selections at 55¢ @ 60¢. Cast Machine Shop Scrap is quoted at 50¢ @ 55¢ for first quality selected, with other lots at 40 @ 45¢, as to quality. Light Iron is dull at 30¢ @ 35¢. Cast Turnings are quoted at 25¢ @ 30¢, with Wrought at 30¢ @ 35¢.

## Pittsburgh.

(By Mail.)

Office of *The Iron Age*, Hamilton Building,  
PITTSBURGH, August 8, 1893.

It would be difficult to imagine a worse condition of affairs than that which now surrounds the Iron and Steel trades, and in fact every other line of business. On every side we see concerns closing down their plants for indefinite periods on account of no orders, for the first time in their history. Perfectly solvent firms are compelled to defer pay rolls, not being able to raise cash to meet them. Hundreds and thousands of idle men throng the streets in search of employment which cannot be obtained. At some of the mills in this city that are operating certain departments, it is a daily occurrence to find two or three hundred men at the gates every morning, each hoping that there will be a place made vacant for some cause, that he will be able to obtain. The situation is certainly a desperate one from every point of view, and the manufacturer, the merchant and the employee are each anxiously scanning the horizon in the hope of catching a first glimpse of the silver lining which the old saw attributes to every dark cloud. On every side the question is asked, when will confidence be restored and business return to its normal condition? Many whose opinion is worthy of consideration say there will be a revival in business before this year is out, while others not so sanguine say that it will require a very long time for the business situation to recover the ground it has lost in the last few months. It is the general opinion, however, that much good is bound to come from the stoppage of so many plants of various kinds. Stocks are low, and when confidence is once restored and buying commences there will be a heavy demand for all kinds of goods and possibly some recovery in prices.

Thus far Pittsburgh has stood the terrible strain in a manner that has commanded the admiration of the whole country. Not a single bank failure has occurred here, and only two or three among the manufacturing concerns, these being concerns that were perfectly solvent, but took the step in order to preserve their own interests and those of their creditors. This is certainly a record of which any city might be proud. For the week under review the local market in Iron and Steel did not show a single encouraging feature. There is little or no demand for anything, and Iron or Steel in any of its various forms can be bought at almost any price, if the buyer has the money to pay for it.

**Pig Iron.**—The market does not show any improvement either in demand or prices, any change in the latter respect being wholly in the direction of lower values. The furnace operators realize that restriction of output is the only safeguard just now, and following out this policy, production of Pig Iron in Allegheny County has been cut down over 10,000 tons per week within a short time. Nor will the restriction movement stop at this, for during this month additional stacks will be shut down, to remain so until the situation improves. In this connection it is pertinent to point out the fact that furnace operators are better prepared to market their production at present low prices and still come out whole, or with a small profit, than ever before. This has been made possible by reason of reductions secured in prices of fuel. Ore is cheaper this year than ever before, while those operators who watched the course of the Coke market closely, and took advantage of the same, are saving from 50¢ to 60¢  $\text{\textcircled{P}}$  ton in this one item alone. Within the past week Bessemer Pig has touched \$12.50, Pittsburgh, but even at this low price there should not have been any loss to the furnace on the sale, but on the contrary a profit should have been shown. In the Mahoning and Shenango valleys production is being cut down, and will be further reduced before this month is out. Blast furnace labor in the valleys has been reduced from 15 to 20 %, taking effect on the 15th inst. In Forge and Foundry Irons there is nothing doing, and will not be until there is greater activity among the mills. With the exception of a sale of 500 tons of Bessemer at \$12.50, Pittsburgh, we are not advised of any transactions since our last report. We quote as follows:

Neutral Gray Forge.....	\$11.75 @	\$12.00, cash.
All-Ore Mill.....	12.00 @	12.25 "
Bessemer Pig.....	12.50 @	12.75 "
No. 1 Foundry.....	13.00 @	13.25 "
No. 2 Foundry.....	12.00 @	12.25 "
Charcoal Foundry No. 1.....	15.00 @	16.00 "
Charcoal Foundry No. 2.....	14.00 @	15.00 "

**Steel.**—There is absolutely nothing doing, and no improvement in demand is expected during this month at least. A few old orders remain to be filled, and a little of this Steel is being called for, but beyond this the mills have nothing to do. The Wheeling plants continue idle, with very little doing in the way of wage-scale negotiations. In the Pittsburgh district some Steel is being made, but it is principally on old contracts. We are advised of one transaction involving 1500 tons at a price reported to be \$20.50 at makers' mill. We make nominal quotation of \$20.25 @ \$20.50, f.o.b. cars at makers' mill.

**Bars.**—The long stoppage of the mills is beginning to tell on stocks, and for certain sizes it is often necessary for a buyer to shop around from mill to

mill before he can find what he wants. As a result of this we can report a slightly firmer tendency in prices. Present appearances indicate that one, and probably two, concerns in this city will shake off the Amalgamated Association and employ non-union men when they get ready to start. Facts are coming to light which show that the charges made by the manufacturers that discrimination was practiced by the Amalgamated Association in favor of certain firms were well founded. The concerns who are particularly affected by this discrimination have no other recourse but to operate non-union, and pay the same scale of wages as their more favored competitors have been granted. We quote Refined Iron Bars at 1.55¢ @ 1.60¢, half extras, and Steel Bars at 1.45¢ @ 1.50¢, with Bar Iron extras.

**Plates.**—Business is very light, the call being for small lots only. No large contracts are in sight, and none are expected until the financial situation is better. Prices quoted are nominal and would be shaded for desirable orders with terms satisfactory to the mill. We quote as follows: Tank, 1.50¢ @ 1.60¢; Shell, 1.65¢ @ 1.75¢; Flange, 1.75¢ @ 1.90¢; Ordinary Fire Box, 2.25¢ @ 2.50¢; Special, 3¢ @ 3.50¢.

**Structural Material.**—Nothing of importance is being offered, new business being for small lots only. Some of the mills have some old orders yet, but these are being finished up pretty fast, while some of them are being canceled. We quote as follows: Beams up to 15 inches, 1.50¢ @ 1.60¢, f.o.b. cars Pittsburgh; Angles and Universal Plates, 1.60¢ @ 1.70¢; Tees, 1.60¢ @ 1.70¢, and Z-Bars 1.60¢ @ 1.70¢.

**Rods.**—The Rod mills continue closed and there is nothing doing. We make nominal quotations of \$27.50, Pittsburgh. It is stated that even this low price has been shaded.

**Muck Bars.**—There is no demand, and we make nominal quotation of \$21 @ \$21.50, delivered at buyers' mill.

**Merchant Steel.**—Business is quiet, with some of the mills off altogether and others operating to half capacity or less. We quote as follows: Open-Hearth Spring and Tire, 1.90¢ @ 2¢; Machinery, 1.90¢; Curved Sleigh Shoe, 2¢; Flat Shaped Sleigh Shoe, 1.80¢ @ 1.90¢; Tool Steel, 5½¢ and upward, according to quality; special brands, 15¢ and upward.

**Wire and Cut Nails.**—Every Wire-Nail mill in this vicinity is closed. Stocks are reported light and prices are showing a slightly firmer tendency. We quote at \$1.35 @ \$1.40 in carload lots, Pittsburgh. Cut Nails are in light demand, and are ruling at about \$1.05 base in carload lots at factory.

**Pipes and Tubes.**—Announcement is made that the Duquesne Tube Works Company of this city, with works at Duquesne, Pa., which concern went into the hands of a receiver about six weeks ago, will be granted an extension, and the receiver will be discharged at an early date. The American Tube & Iron Company, who have also gone into the hands of a receiver, have announced a reduction of 10 % in wages, to apply at their mills at Youngstown, Ohio, and Middletown, Pa. Neither plant has resumed operations, but one or both of them will probably start up at an early date in order to complete some old contracts. There is little or no demand for Pipes



and Tubes, and prices continue very irregular. The prospect of any improvement in either direction in the near future is not encouraging.

**Wire.**—The mills continue idle, and, with stocks being depleted very rapidly, this industry should be in much better shape when operations are resumed than it has been for some little time. Some mills have a few contracts not yet filled, which will keep them running for some little time when they start up again. The works of the Pittsburgh Wire Company, at Braddock, makers of Plain Wire of all kinds, have again resumed operations. Work was resumed under a new wage scale, slight reductions being made in several departments. We quote Four-Point Galvanized at \$2 25, and Painted at \$1 85, in carload lots. Plain Wire is being offered at \$1.60 in carload lots, and \$1.70 in less quantities.

**Sheets.**—Trade is very quiet and few of the mills are in operation. There is considerable dissatisfaction expressed by certain concerns over the wage scale adopted at Pittsburgh last month, the claim being made that had negotiations been continued a little longer a reduction in wages would have been secured, which would have enabled them to better meet the excessively low prices at which their product is now being offered. Trade has fallen off very rapidly during the last month or so. Some concerns that started up after the adjustment of the wage scale have been compelled to close down again. We quote No. 24 Soft Steel Sheets at 2.40¢; No. 26, 2.50¢ and No. 27, 2.60¢. Galvanized Sheets are ruling at 70 and 10 % discount.

**Coke.**—Week before last nearly 2000 active ovens in the Connellsville region were blown out and at this time there are about 1000 more idle ovens than active ones. For the week ending July 29 there were 8310 ovens in the Connellsville region in blast and 9023 idle, with a total estimated production for the week of 69,332 tons. Compared with the production of the previous week this was a decrease of 18,774 tons. The demand continues to fall off rapidly, and the rapidity with which furnaces are being blown out does not promise well for the future. Furnace Coke continues to be offered at \$1 25 in tons of 2000 lb, f.o.b. cars in Connellsville region. Foundry Coke is quoted at \$1.50 to dealers and \$1 65 to consumers.

## Cleveland.

CLEVELAND, OHIO, August 7, 1893.

**Iron Ore.**—The situation is practically the same as it was a week ago. In a few producing districts men with families have been put to work, but as an offset to this the big Minnesota Iron Company have suspended all mining operations, the present force being limited to surface men engaged in shipping Ore from stock. A dispatch to a morning paper says: "A story has been set in circulation from Duluth that the Minnesota Iron Company have succeeded in gaining extensive holdings in valuable Mesaba mining properties, but there is a general disposition to look upon it as a stock jobbers' story to buoy up Mesaba stocks, which have been decidedly sick of late. The stagnation in Iron stocks is by no means confined to the shares of Mesaba range mines, but extends all along the line. As few of the stocks of Iron mining companies are listed on any exchange, it is difficult

to learn just what is being done in the way of transfers, but from accounts of brokers there is very little doing, even at the demoralized figures of the present." It may be said that interest in the Ore situation no longer centers in the condition of the market, but, instead, in the relative value of stocks. It is asserted in many quarters that the present depression in the Iron Ore market is entirely removed from the financial situation and would have come about despite anything and everything. The same writer quoted above says: "Overproduction, ruinous competition by impoverished and practically bankrupt concerns, have made the Iron Ore trade unsatisfactory for some time, and this year the culmination of the trouble is at hand. Many small mines have been squeezed out entirely, and all the large ones are pressed for cash with which to operate. There is little danger, however, that many big companies will go to the wall. They will suspend operations entirely before it becomes too late, and many have already done this, while, with one exception, the big mines still operating are running reduced forces, and at all Iron mines in the district wages have been reduced." Reduction in royalties is being urged as a partial cure for existing conditions. Ten years ago Ores selling for \$5 @ \$6 ¢ ton could well afford to pay a royalty of 40¢ or 50¢. The same Ores are now worth about half the money and 20¢ is considered a fair royalty. The Winthrop Iron Company's royalty was recently reduced from 40¢ to 20¢ ¢ ton, and as a result the company are now employing 300 men. The market is, of course, dull. An occasional sale of Ore is reported, but the consideration is, as a rule, rigorously guarded. It is admitted that Bessemer Ores that last season sold readily for \$4.25 @ \$4.50 have been sold this season for from \$3 50 to \$3.75, and that new Bessemer have sold lower than ever before. There is no change in the freight situation, the Escanaba rate remaining at 45¢ ¢ ton, while but 60¢ is paid from the head of Lake Superior. During the week just closed 31,000 tons were sent forward to the furnaces, as compared with 19,000 tons for the same week in 1893. It is still believed that some buying will be done before August 15.

**Pig Iron.**—The local market is entirely lifeless. Beyond the purchases by Corrigan, Ives & Co. at the auction sale of Pig Iron a week ago, the situation locally is devoid of features of every kind. Foundry and Mill Iron are reported weak. Bessemer Iron could not well be weaker. Nominal quotations are:

Nos. 1 to 6 Lake Superior Char-	\$15.75 @	\$16.00
coal.		
Nos. 1, 2 and 3 Bessemer, ¢ ton.	13.00 @	13.15
No. 1 Strong Foundry, ¢ ton.	13.50	
No. 2 Strong Foundry, ¢ ton.	12 75 @	13.00
No. 1 American Scotch, ¢ ton.	14.25	
No. 2 American Scotch, ¢ ton.	13 25	
Mahoning and Shenango Val-		
ley Neutral Mill Irons, ¢		
ton.	13.00	
Mahoning and Shenango Val-		
ley Red Short Mills, ¢ ton.	12.25	

**Nails.**—The market is fairly active. Dealers quote Steel Wire Nails at \$1.55 from stock, with a moderate demand.

**Muck Bars.**—There are few new features, and inquiries even at the present quotations, \$22.25 @ \$22 50, are limited.

**Scrap Iron.**—Although the market is dull, inquiries indicating something better are being received. Dealers quote to day: Cast Scrap, \$10.50 ¢ net ton; Wrought Scrap, \$12.50; Cast Borings, \$7 ¢ ton.

**Old Rails.**—Old Americans can be bought for \$16.50 @ \$17 ¢ ton, but there is only a limited demand.

**Wire.**—A slight demand and no change in prices fully indicates the situation.

## Financial.

The most pronounced feature of the week in financial circles has been the great scarcity of currency. Of small money there has been a veritable famine, so that cash was bought and sold over the counter by Wall street money brokers at as high a premium as 3 % and 4 %, while in a few cases 4½ % is said to have been paid by banks for large amounts. The general rate on Tuesday was about 3 %. Applications for currency from interior points continue pressing, but they have been largely refused by New York banks, who have all they can do to supply the immediate requirements of their city customers in this respect. Many banks, indeed, have been obliged to discriminate where there was a reasonable impression that cash was to be used either for hoarding or for selling. This scarcity of currency is just now thought to be the most serious financial question of the hour. Many believe that it will not be relieved until confidence is restored and Congress has repealed the silver-purchase clause of the Sherman law, when the money hoarded or held, reinforced by imported gold, should circulate again freely. Meanwhile the shipments of funds from New York to interior banks have fallen off somewhat in amount, and fresh consignments of gold arrive from Europe and the West Indies almost every day. One result of the premium put on ready money has been an alteration of conditions in foreign exchange rates. These rates are now above the point at which gold imports would ordinarily be possible, but, with the premium for cash, gold can still be brought here at a good profit. It is estimated that some \$15,000,000 represents the sum obtained from London during the past week and now *en route* to this port, besides various amounts obtained by Chicago, Philadelphia and Boston financial establishments. A great part of this money has been secured by New York banks, although some has been bought by the money brokers at a premium of from ½ to 1½ %. Canada, too, has been remitting some considerable sums of American money to banks and brokers.

The failures of the week have not been of prime importance, except in the case of three large St. Paul banks and a big dry goods house at Chicago. *Bradstreet's* reports 456 failures in the United States during the week ending August 5, against 489 in the preceding week, and 155, 218, 155 and 173 in the corresponding weeks of 1892, 1891, 1890 and 1889. The Middle States had 69, New England 68, Southern 41, Western 151, Northwestern 83, Pacific 31, Territories 13. Canada had 43, against 33 for the previous week. Of failing enterprises 71 per cent. were of those employing capital of \$5000 or less, and 10 per cent. of those with \$5000 to \$20,000 capital. Eighty-two failures are reported with capital in excess of \$20,000.

News still comes in of the shutting down of mills and factories on account of the general dullness in trade and tightness of money. Most of the New England mills have closed down or reduced their working force very materially. The manufacturers of that sec-



tion do not, however, take any despondent view of the situation, and in many cases are even glad of the excuse to suspend operations for a few weeks at this season in order to make necessary repairs. It is whispered that the opportunity will be embraced for a readjustment of wages before another start is made.

The Presidential message was generally well received in the business world of this city, and it will, it is thought, have a steadying effect upon the trend of business by restoring confidence and removing the uncertainty which has existed for so many weeks. Business in general will not in all probability at once recover from the crash, but the conditions of recovery are believed to be present. The monthly statement of the State Superintendent of Savings Banks of New York shows that during the first six months of 1893 the savings banks have paid out over \$100,000,000. The New York City savings banks owed their depositors on July 1 \$347,167,960 and had cash in hand \$23,560,000. Their resources are, however, nearly \$50,000,000 more than their debts.

The loan market for money on call is decidedly easier, contrasting strongly with the urgent demand and high rates for loans on time. Borrowers of call money on stock collateral have been able to obtain ample accommodations at from 2 to 6 % during the week. Industrial securities are not, however, generally received except on unusually wide margins. Tuesday's closing rate for call money was 2 %, the rate for the day averaging 4 %. Time money is still very closely held and in urgent demand. Quotations are nominally 6 %, but a liberal commission has to be paid to brokers where the necessity for accommodation is urgent, bringing the actual rate up to 7 @ 9 % for fairly long contracts. Mercantile paper continues stagnant. Call money in London on Tuesday was 1 @ 1½ %; short and three months' bills, 2½ @ 3 %. Lending rates for stocks are: Chicago, Burlington & Quincy, Rock Island, and Western Union, 1.64¢; New York Central, Louisville & Nashville, and Lake Shore, 1.32¢; Chicago Gas, Northwest, Union Pacific, and Northern Pacific, preferred, flat, and St. Paul, Atchison, and General Electric, 2 % for carrying.

Saturday's weekly statement of the Associated Banks was unfavorable, losses both in the cash and surplus reserve being much in excess of the amount generally anticipated. The deficit in reserve increased \$9,716,125 and now stands at \$14,017,900, against a surplus a year ago of \$18,798,425. Specie held is \$55,929,800, against \$90,635,000 in 1892. Legal tenders are \$23,288,700, against \$60,278,100 a year ago. The Clearing House Loan Committee have issued during the week \$7,315,000 more loan certificates, bringing the total amount now outstanding up to \$36,565,000. It has been pointed out that comparisons of this sum with that of the certificates issued by the Associated Banks during the panic of 1873 is hardly fair, for although it exceeds the maximum of that period by some \$12,000,000, the banks' deposits and resources have nearly trebled during the interval. Bar silver has gained strength, being now sold at 76¢ ¢ ounce in New York and 34½d. in London. The Treasury purchased 410,000 ounces on Tuesday at 72.6¢. Some considerable shipments of the white metal have been made during the week.

Foreign exchange is strong and has advanced from 2¢ to 5¢. Nominal

rates for sterling on Wednesday evening were \$4.84½ for 60 days and \$4.89 for demand, actual business being done at from 2¢ to 2½¢ lower. Sellers of commercial exchange are securing somewhat better rates for their bills against grain and cotton exports, which are offered in fairly large amount.

Domestic exchange on New York: Boston—\$1.50 @ \$2 premium for cash; checks, 15 cents discount to par. Charleston—Buying, par; selling, ½ premium. Savannah—Buying, ½ discount; selling, par to ½ premium. New Orleans—Bank, 130 discount. Commercial, 300 discount. San Francisco—Sight, par; telegraphic, 5. St. Louis—\$5 discount. Chicago—3 % discount.

Despite bad monetary conditions, stocks made a somewhat unexpected movement in advance during the closing days of last week, which, with some fluctuations in industrials, has been fairly maintained. On Monday, however, a sharp break occurred in Missouri Pacific, Northern Pacific, preferred, and Union Pacific, owing to unfavorable rumors in regard to these roads. They recovered somewhat before the close of the day. On Tuesday the market was dull, but another sharp decline was experienced in industrials and some Western railroad stocks. Some feeling of uneasiness and uncertainty prevailed, operators awaiting the Presidential message, and receipt of which was followed by a further drop in industrials, probably owing to the reference in the message to tariff reform. The stock market closed somewhat steadier in tone on Tuesday evening. It declined on Wednesday, but recovered toward the close. The changes in the leading active stocks during the week are shown below:

	Aug. 2.	Aug. 9.
American Sugar Ref.	71 to 70½	72½ to 72
Am. Sugar Ref. Pf.	72½ to 72	55 to 59½
Am. Tobacco	55 to 59½	76½ to 80
Am. Tobacco Pf.	76½ to 80	60½ to 67
Balt. & Ohio	60½ to 67	46½ to 48½
Chicago Gas	46½ to 48½	56 to 51½
Chic. & E. Ill.	56 to 51½	94½ to 93½
Chic. & N. W.	94½ to 93½	78½ to 76½
C. B. & Q.	78½ to 76½	13½ to 136
Del., Lack. & W.	13½ to 136	90 to 87
Evansville & T. H.	90 to 87	45 to 41½
Genl. Electric	45 to 41½	57 to 56
L. E. & Western Pf.	57 to 56	110½ to 110½
Manhattan	110½ to 110½	21½ to 21½
Missouri Pacific	21½ to 21½	59 to 58
Nat. Lead. Pf.	59 to 58	100½ to 97½
N. Y. Central	100½ to 97½	140 to 142½
Pullman Car.	140 to 142½	62½ to 64
U. S. Rubber Pf.	62½ to 64	20 to 18½
Union Pacific	20 to 18½	37½ to 40½
Wheel. & L. E. Pf.	37½ to 40½	

The railroad and miscellaneous bond market has been irregular. During the present week it has remained dull and weak. Government bonds are active and steady. At the board on Tuesday \$61,000 coupon 4s brought 110½, and \$23,100 registered at 110 to 109½.

The Produce Exchange markets are only moderately active. Prices show a decline on wheat and corn, induced by lower cables, realizing here and in the West, extensive shipments from India, and an unfavorable view taken in some quarters of the President's message. A slump in wheat of 2¢ a bushel occurred in Chicago on Tuesday. Shippers bought freely of spot wheat at the decline. Cotton is irregular, closing on Tuesday at a decline of 1 @ 3 points on better reports of Texas crop prospects.

A plan is under advisement in Massachusetts to celebrate in an appropriate manner the two hundred and fiftieth anniversary of the establishment of the Saugus Iron Works.

## Metal Market.

**Copper.**—Lake Superior Ingot has been offered at as low as 94¢ ¢ lb on the Metal Exchange for August and September delivery. The terms were net cash. A few small parcels have been sold at very near to that price from second hands. As a rule, producers' agents claim that anything below 10¢ is the exception, but there is enough outside selling and offering to make it very difficult to maintain prices on the basis of 10¢ for this month delivery. Hardly as formidable competition has developed in the cheaper varieties of the metal, but the doings in those branches have been weighty enough to carry prices down to 9½¢ for Electrolytic and 9¼¢ for common casting brands, temporarily at least.

**Pig Tin.**—There has been quite sharp aggressive action on the part of prominent operators who fear the "bear" side of the market for the time being. They focussed upon interests supposed to be heavily loaded with Tin, but thus far signs of distress in that quarter are absent, although the maneuvering has proven very irksome elsewhere. While there has been a certain amount of resistance to bear pressure and other disturbing influences, it is simply a matter of record that the price for spot Tin has fallen to 18.45¢, net cash, or about ¼¢ during the past week. The following interesting remarks appeared in the Metal Exchange circular of August 8: The official returns of the United States Bureau of Statistics give the following figures for the fiscal year ending June 30, 1893:

Total importation of Tin into the United States....	61,076,464 lb.
Of which were re-exported.....	231,204 lb.

	60,845,260 lb.
Of which were imported into Pacific ports.....	2,680,777 lb.

Leaving a net importation of.....	58,164,483 lb.
Equal to.....	25,966 tons
of 2240 lb. for the United States, excluding the Pacific ports.	

According to these figures the consumption of the United States for the year ending June 30, 1893, has been as follows:

Stock, June 30, 1892.....	3,800 tons.
Import for year ending June 30, 1893, excluding Pacific ports.	25,966 tons.
	29,766 tons.
Stock in United States, excluding Pacific ports, June 30, 1893	9,910 tons.

Consumption for year ending June 30, 1893, excluding Pacific ports.....	19,856 tons.
Imports into Pacific ports during the year, taken as consumed there, 2,680,777 pounds, equal to.....	1,197 tons.

Total.....	21,053 tons
foreign Tin consumed in the United States during the year, as stated above.	

These figures are a further proof of the correctness of the monthly statistics compiled by this exchange. The latter with the beginning of this year took the consumption of the United States:

Excluding the Pacific ports, at an average of.....	1,600 tons per month;
the actual consumption 19,856 tons per year gives an average of...	1,655 tons per month.

**Pig Lead.**—Under the financial pressure some holders have parted with stock at 3.25¢ @ 3.80¢. As far as could be learned, about 500 tons went at those figures, nearly if not all of which was taken by consumers for

prompt delivery or immediate shipment. That the purchases could be duplicated is not clear, but the indications at this writing are that 3.80¢ stands as selling price for ordinary Western in round lots, or, at least, the best at which round lots can be placed for prompt or current-month delivery.

**Spelter.**—Consumers who purchase in this market have been extremely indifferent buyers the past week. Lower prices named by sellers have failed to arouse interest in the slightest degree, and, to all accounts, immediate wants have necessitated none but very commonplace purchases. Prices were rather weak at the close, with 3.90¢ @ 3.95¢ quoted on carload or larger lots for early shipment.

**Antimony.**—The market has remained very quiet and prices have undergone little if any change. The figures quoted on round lots are 9½¢ @ 9¾¢ for Hallett's, 10¼¢ @ 10½¢ for L.X., and 10½¢ @ 10¾¢ for Cookson's.

**Tin Plate.**—Ordinary Coke Plates have been sold at 2½¢ @ 5¢ below the popular quotations. Bright Charcoals and Terns have passed out at similar concessions. Upon the whole the market shows soft tone, and there is no disguising the fact that business is slower than usual at this season of the year, particularly with can makers, whose orders are cut down through unfavorable prospects for fruit and late vegetable crops. Spot quotations are about as follows: Coke Tins—Penlan grade, IC, 14 x 20, \$5.30; J. B. grade, do., \$5.40; Bessemer full weight, \$5.35; light weights, \$5 @ \$5.02½ for 100 lb., \$4.90 for 95 lb., \$4.80 for 90 lb. Siemens Steel scarce. Stamping Plates—Bessemer Steel, Coke finish, IC basis, \$5.60; Siemens Steel, IC basis, \$5.65; IX basis, \$6.75. Charcoals—Melyn grade, IC, \$6.35 @ \$6.37½; Crosses, \$8; Allaway grade, IC, \$5.60; Crosses, \$6.80; Grange grade, IC, \$5.70; Crosses, \$6.85. Charcoal Terns—Worcester, 14 x 20, \$5.70; do., 20 x 28, \$11.35; M. F., 14 x 20, \$7.85; do., 20 x 28, scarce; Dean grade, 14 x 20, \$5.30 @ \$5.37½; do., 20 x 28, \$10.50 @ \$10.60; D. R. D. grade, 14 x 20, \$5.10 @ \$5.15; do., 20 x 28, \$10.10; Alyn, 14 x 20, \$5.32½ @ \$5.35; do., 20 x 28, \$10.40; Wasters—S. T. P. grade, 14 x 20, \$4.87½; do., 20 x 28, \$9; Abercarne grade, 14 x 20, \$4.87½; do., 20 x 28, \$8.90.

## New York.

Office of *The Iron Age*, 95-102 Reade street, }  
New York, August 9, 1893. }

**Pig Iron.**—We print elsewhere our monthly summary of current Pig Iron production, which gives numerical expression to the tremendous falling off in production. Locally the market is quiet and weak, there being urgent sellers and a very slack demand. We quote Northern brands \$14 @ \$15 for No. 1; \$13.25 @ \$14.50 for No. 2; \$12.25 @ \$12.50 for Gray Forge, at tidewater. Southern Iron, same delivery, \$13.75 @ \$14.50 for No. 1; \$12.25 @ \$13.25 for No. 2; \$12 @ \$12.25 for No. 3; \$12 @ \$12.25 for No. 2 Soft, and \$12.50 @ \$13 for No. 1 Soft. Gray Forge remains \$11.50 @ \$2.50.

**Spiegeleisen and Ferromanganese.**—There has been no business. Ferromanganese is nominally \$55.50 @ \$56 at tidewater.

**Billets and Rods.**—The market is very dull. We quote nominally: Domestic Billets, \$23 @ \$24, and foreign Billets, \$28 @ \$28.50, tidewater;

domestic Wire Rods, \$30 @ \$31, and foreign Rods, \$39.50 @ \$40.

**Steel Rails.**—The only features of the market are cancellations of orders, which come even from the strongest roads. To the weaker lines the mills do not ship Rails rolled until payment is secured.

**Track Material.**—We quote: Spikes, 1.70¢ @ 1.90¢; Fish Plates, 1.45¢ @ 1.60¢; Track Bolts, Square Nuts, 2.25¢ @ 2.40¢, and Hexagon Nuts, 2.40¢ @ 2.50¢, delivered.

**Manufactured Iron and Steel.**—Very little is doing. One moderate-sized contract, which a Western mill agreed to deliver on quickly, was canceled and placed at better terms with an Eastern works. Nothing new of magnitude has come up, although at least one large transaction is pending. Plates are very dull. We quote: Beams up to 15-inch, 1.80¢ @ 2¢; 20-inch, 2.10¢ @ 2.25¢, for round lots; Angles, 1.75¢ @ 1.90¢; Universal Mill Plates, 1.70¢ @ 1.90¢; Tees, 2¢ @ 2.15¢; Channels, 1.85¢ @ 2¢, on dock. Steel Plates are 1.65¢ @ 1.90¢ for Tank; 1.90¢ @ 2.10¢ for Shell; 2¢ @ 2.15¢ for Flange, and 2.50¢ @ 2.80¢ for Fire Box, on dock; Refined Bars are 1.60¢ @ 1.9¢, on dock, and Common 1.45¢ @ 1.60¢; Soft Steel Bars are 1.50¢ @ 1.70¢; Scrap Axles are quotable at 1.80¢ @ 2.10¢, delivered; Steel Axles, 1.75¢ @ 2¢, and Links and Pins, 1.80¢ @ 2.10¢; Steel Hoops, 1.75¢ @ 1.90¢, delivered; Cotton Ties, 75¢ @ 85¢ bundle, at mill.

**Old Material.**—We quote nominally Old Iron Rails at about \$15 @ \$15.50; Old Steel Rails, \$12.50 @ \$13; No. 1 Wrought Scrap Iron at \$15 @ \$15.50, and Car Wheels at \$11.50 @ \$12.

## British Iron and Metal Markets.

[Special Cable Dispatch to *The Iron Age*.]

LONDON, WEDNESDAY, August 9, 1893.

The market for Pig Tin has been quiet, and prices are a shade easier. Straits sold down to £81. 5/ for prompt delivery on Tuesday, and at the close to-day the quotations were £81. 5/ for prompts and £81. 10/ for three months' futures. Liquidation by small dealers and lack of outside demand is held responsible for the decline. The improvement in the statistical position and the advance in silver seem to have no influence, owing to fears of larger Eastern shipments to this port in the near future.

Merchant Bar Copper for prompt delivery has dropped to £41. 11/3 and the market continues weak. Heavy supplies from the United States continue to depress the market. Some buying has been attracted by the lowness of prices, favorable position of stocks and hope of early improvement, but not enough to influence prices. Sales of furnace material recently include 1200 tons Argentiferous Montana Matte, at 9/; 250 tons ditto, at 8/9; 3385 tons Anaconda, at 9/; 550 tons ditto, at 8/9. Last prices on Merchant Bars were £41. 7/6 for prompt delivery and £41. 15/ for three months'

futures. Best selected English, £46 10/.

In the market for Tin Plate there has been very little change. Some sellers note rather better inquiry, but bids are invariably very low and operators inclined to postpone business as much as possible, pending better reports from America. The mills are indifferently employed and makers are not forcing sales, owing to lowness of prices. Exports last month were 33,000 tons, against 31,000 tons in July, 1892. Shipments to the United States, 22,000 tons and 24,000 tons respectively. Liverpool prices are as follows:

IC Charcoal, Alloway grade.....	13/0 @ 13/6
IC Bessemer Steel, Coke finish.....	12/0 @ .....
IC Siemens.....	12/3 @ .....
IC Coke, B. V. grade, 14 x 20.....	11/9 @ 12/
Charcoal Terne, Dean grade.....	11/9 @ 12/

Pig Lead has met with very low sale, but prices have ruled quite firm, closing at £10. 5/ for Soft Spanish.

Spelter meets with slow sale and prices are easy at about £17. 10/ for ordinary Silesian.

Exports of Pig Iron in July amounted to 79,000 tons, against 59,000 tons in the corresponding period last year. Along with fair home movement this has operated to keep values quite steady. Last sales of warrants were at 42/4 for Scotch, 35/6 for Cleveland, and 45/4½ for Hematite.

Geo. B. Roberts, president of the Pennsylvania Railroad Company, has caused to be issued from the general offices of the company at Philadelphia, an order for the reduction of the hours of labor in the mechanical departments from six days a week of ten hours per day, to five days of nine hours each. This order affects all the shops of the Pennsylvania system, including the leased and controlled lines. This action is taken with a view of reducing expenses and is in line with the policy of rigid retrenchment inaugurated some time ago, the beneficial effects of which have already been manifested in the shape of a large increase in the net earnings.

One of the biggest street railway negotiations ever made was consummated in New Jersey a few days ago. The New Jersey Traction Company have absorbed or leased the traction lines in almost all the cities of the State, so that the syndicate now enjoys a practical monopoly of the street railway interests throughout New Jersey.

Heavy rains in the British Isles have somewhat relieved the gloom which has enveloped the agricultural industries, and better prospects for the wheat crop are reported, although the harvest will be a bad one in most parts of England. The *Times* says, however, that the condition of agriculture in Great Britain is about as bad as it can be, and prices for cereals, sheep and cattle are lower than they have been for years.

One of the engines of the train of the Maryland Steel Company has been repaired and will start up this week.

Fuller Brothers & Co. of 139 Greenwich street, New York, have made an assignment to Cadwallader R. Mulligan.

# HARDWARE.

## Condition of Trade.

**T**HERE is very little change to note in the condition of the Hardware trade during the week. Buyers, large and small, are confining their purchases strictly to their immediate requirements, and manufacturers are everywhere reducing their production to as low a point as they can. Those who have many goods on hand are generally shut down. Manufacturers and jobbers are making very little effort to force goods on the market, there are few travelers on the road, and the business which is being done is confined to orders to complete assortments. While collections are still slow, we hear many reports of improvement in this respect.

### Chicago.

(By Telegraph.)

The Hardware trade generally shows no signs of improvement, but on the other hand it does not continue to fall off. A very steady movement has been in progress for the last two or three weeks. The merchants appear not to be worrying over lack of trade, however, as they state that they would not care to put out large lines of credit under existing financial conditions. They are now patiently waiting for the tide to turn, which they think will probably occur after the crops of this season are safely housed. Collections are fairly good, as debtors are liquidating as rapidly as possible.

Parkhurst & Wilkinson have opened their Heavy Hardware jobbing establishment under the assignee. They hope soon to take the business out of the hands of the assignee by making an arrangement with their creditors for time payments. The firm are confident that they will be able to pay their creditors in full and express their intention not to ask for a compromise.

### St. Louis.

(By Telegraph.)

Jobbers report the month of July as the lightest, so far as volume of business is concerned, that they have experienced for some years. Trade continues in the same condition as in July, and the only feature of improvement is in the matter of collections, which are better than they have been for several weeks past. In Barb Wire and Wire Nails low prices are being made, but sales fail to materialize. Jobbers appear well satisfied with Mr. Cleveland's message and look for the early repeal of the Sherman bill, which

they declare will restore confidence, now so scarce. Manufacturers of Hardware having partly or in whole closed down, are not offering any large quantities of goods, and prices are fairly well maintained. Should business right itself in the next 60 days jobbers will find it hard to fill their orders, as they are at present only buying what they absolutely need, and refuse to purchase for delivery during the fall months. The Southern trade will doubtless be heavy, as the cotton crop will be good and fair prices are expected.

## Notes on Prices.

**Cut Nails.**—During the past week inquiries from all sections have been extremely light. Most of the mills are closed, and production continues very small. Quotations still rule at \$1.05 for carload lots at mill, but Nails have been offered at lower prices, and concessions can be obtained without difficulty on desirable orders. Small lots from store in New York are held at \$1.30.

**Chicago, by Telegraph.**—This branch of trade is in the same condition as reported during the last few weeks, only small quantities being called for from the factories, and the old prices prevailing of \$1.20 to \$1.25, according to quantity. Assortments in factory warehouses are being broken, however, and some of the manufacturers will have to start operations soon to keep up stocks. Jobbers report a light trade, with prices unchanged at \$1.25 to \$1.30, according to quantity.

**Wire Nails.**—Negotiations for an agreement among the makers for the regulation of this business are still progressing. Mills are generally closed, although stocks in their hands are small. The regular quotation for carload lots at mill remains unchanged at \$1.35, but, as we noted last week, this price is shaded.

**Chicago, by Telegraph.**—Arrangements were practically consummated at the meeting of the Wire-Nail manufacturers last week for the formation of a pool to control the output of Wire Nails, and in this way limit the production to the actual requirements of consumers. The manufacturers hope to thus regulate prices, and avoid the ruinous rates which prevailed throughout the country this spring. A meeting is to be held this week to complete the arrangement and perfect some details for carrying it out. In the meantime prices are maintained at \$1.45, Chicago, for factory lots, and the mak-

ers are restricting their terms to 2 per cent. off for cash, or 10 days' time instead of the usual 60 days. The factories are expected to continue shut down during the whole of August, so as to clean up stocks in the different warehouses. Jobbers report their prices unchanged at \$1.55 to \$1.60 from stock, according to quantity.

**Barb Wire.**—Trade is extremely light in Barb Wire, and quotations remain nominally at \$2.45 to \$2.50 for carload lots of Four-Point Galvanized at mill, small lots from store being held at the usual advance. The Continental Wire Company, St. Louis, under date of August 1, send out quotations shading these prices 15 cents "to close out stock on hand."

**Chicago, by Telegraph.**—There is a great deal of competition for the small business now in sight and prices have receded considerably. The manufacturers are selling for shipment from factory at \$2 for Painted and \$2.40 for Galvanized, while even this is not a fair price when sales are made in competition with St. Louis manufacturers. Jobbers report a better demand from the farmers with sales of small lots from stock at \$2.20 to \$2.60 respectively.

**Metal Mat.**—Joshua Horrocks, 45 Cliff street, New York, is offering his Metal Mat from the following list, subject to a discount to the trade of 50 per cent.:

No.	Each.
1, 16 x 24.....	\$2.00
2, 18 x 30.....	2.50
3, 22 x 36.....	3.50
4, 24 x 48.....	5.00
5, 30 x 48.....	6.00
6, 36 x 48.....	7.00
7, 36 x 60.....	9.00
8, 36 x 72.....	11.00
Extra sizes, 90 cents per square foot.	

**Steel-Clad Wringer.**—A description of this Wringer appears in another part of this issue. It is put on the market by the Lovell Mfg. Company, Erie, Pa., for whom W. H. Quinn & Co. are agents, 103 Chambers street, New York. The Wringer is sold from the following list, which is subject to a discount of 12½ per cent. to the trade:

Size numbers.	Size of Rolls.	Per dozen.
310	10 x 1½	\$2.00
312	11 x 1½	38.00
314	12 x 1½	44.00
316	10 x 1½	38.00
318	11 x 1½	44.00
320	12 x 1½	52.00

**Cabinet Hardware.**—Hammacher, Schlemmer & Co., 209 Bowery, New York, have issued discount sheet No. 4, under date of August 1. The discount sheet applies to their 1890 catalogue of Cabinet Hardware.

**Adjustable Bicycle Wrench.**—This article, which is put on the market by the Cobin Mfg. Company, 107 Chambers street, New York, was illustrated in our last issue. The list price on the bright is \$9 per dozen, and on the nicked \$11 per dozen, these prices being subject to a discount of 40 per cent., with 2 per cent. additional for cash in ten days.

**Shot.**—In consequence of the low prices of lead the Shot manufacturers have issued a new list dated August 1, showing a reduction on 25-pound bags of 5 cents per bag on Drop, Buck and Chilled Shot, but no change in Dust Shot. In addition to this the usual 20 cents per 100 pounds is allowed on lots of 2000 pounds and upward, as well as a special discount of  $2\frac{1}{2}$  per cent. on like quantities bought, invoiced and paid for at one time.

**Rope.**—Although at this season of the year transactions in Rope are light, and this year more so than usual, prices have been reduced about  $\frac{1}{2}$  cent per pound. We quote for Rope of  $\frac{7}{16}$  inch diameter and larger as follows:

	Cents.
Manila.....	8
Sisal.....	6 $\frac{1}{2}$
New Zealand.....	6 $\frac{1}{4}$

**School Slates.**—The advance noted in these goods a few weeks ago continues and they are now held at higher prices. Quotations are now on single case lots, 40 to 40 and 10 per cent., and in large lots, 40 and 10 and 5 per cent. to 50 per cent.

**Double-Pointed Tacks.**—Manufacturers of this line are now off ring them at lower prices. Quotations run from discount 90 and 10 per cent. to 90 and 10 and 10 per cent.

**Glass.**—Representative New York wholesale dealers in both domestic and imported Glass state that their sales for the month of July ran ahead of those for the corresponding month last year. Conservative customers of these concerns are reported as ordering only what they need, and what they are able to pay for; and probably would not buy for speculative purposes if Glass was offered at half the present price. This course of action is looked upon as an encouraging feature in the present financial situation. There is a continual consumption of Glass in a limited way throughout the country for repairs and small improvements, the outlay for which is small in individual cases, yet in the aggregate amounts to a large sum. Prices on American and imported Window Glass remain unchanged, and it is generally believed that a reduction in prices would not increase sales; and that it would be equally undesirable at this time to advance prices. Reports have been circulated that, owing to a reduction in the price of imported Plate Glass by the manufacturers, American manufacturers are about to announce a reduction in price of domestic Glass equivalent

to about 5 per cent. New York importers remark that they have been unable to learn of imported Glass being offered at less than regular prices but that it is generally understood that a reduction is to be made in the price of American Plate Glass. A Pittsburgh paper devoted to the Glass interests, reports the Plate Glass works at Irwin, Pa., as having resumed work with a full quota of men, the latter having agreed to return to work at a 5 per cent. reduction in wages. We quote prices unchanged, as follows; American Window Glass, 2000 boxes at one time, 80 and 10 and 10 per cent. discount; carloads, 400 boxes, 80 and 15 per cent. discount; less quantities than carloads, 80 and 10 per cent. discount. Freight allowed on car lots and over, not to exceed  $17\frac{1}{2}$  cents per 100 pounds; less than car lots, f.o.b. at shipping point. French Window Glass, 75 and 10 and 5 per cent. discount. American Plate ranges in price from 50 and 10 and  $7\frac{1}{2}$  per cent. discount to 60 and 5 per cent. discount. Imported Plate Glass, 60 per cent. discount to 60 and 10 and 5 per cent. discount.

### Export Notes.

WE ARE advised by export merchants of prominence that the recent disturbances in the Argentine Republic, more particularly in the states of Buenos Ayres and Santa Fé, are but the culmination of the troubles of a year or so ago. When the corrupt Celman administration in national affairs was overthrown, some of the same species were left in charge of state governments. Now the people have completed the transaction, and business interests here having much at stake there express themselves as well pleased with the result, and allude to it as a bad spot removed from the body politic.

The two competing interests operating a steamer service between New York and South African ports, known as the Union Line, Arkell & Douglas agents, and the joint Bucknall Bros. and Castle lines, Norton & Son agents, have agreed for the balance of the year to alternate steamers, about every 25 days, instead of loading on similar dates. An advance of 2 shillings 6 pence per ton has been made for the August steamer, and an additional advance of 2 shillings 6 pence will be made on the steamer to follow, making September rates 5 shillings per ton over those current in July.

A fair estimate of the depreciation of Mexican currency is afforded by the current rates of exchange, now quoted at  $167\frac{1}{2}$  for 60 days, and 170 for demand. But two or three weeks ago fair rates ranged from 156 to 160. It will readily be seen how this condition operates as regards importations, which must be paid for in gold or its equivalent, naturally shutting out such ar-

ticles as can be dispensed with, while stimulating the production of such as can be manufactured in that country.

We are informed by a foreign correspondent that the progress now being made in agriculture in the Orange Free State, South Africa, is creating an important market there for Agricultural Implements and Machinery, Wind Mills, various kinds of Metal, Wires, &c. So far these imports are largely monopolized by England and America, but we have reason to believe Germany will shortly be sending competent travelers to this region. A World's Fair visitor in New York, from this colony, recently left an order for 100 barrels of seed potatoes. Such requisitions should be doubly welcome, as it is a fair inference that we can also sell them Farm Tools with which to care for this and similar products.

### South African and Argentine Commerce.

NORTON & SON, agents for the American & African Steamship Line to leading South African ports, report the arrival out of the first two steamers from New York to Cape Town, as follows: Steamer "Worcester," sailing May 26, arrived June 22; steamer "Florida," sailing June 27, arrived July 29. The last steamer dispatched was the "Bede," leaving July 28, carrying mail and three first-class passengers, in addition to a full cargo below deck, as well as a deck load of staves. Notwithstanding her bunkers were full, a portion of her coal supply was also on deck. Her capacity is 4500 tons of merchandise. The next steamer in berth will be the "Constance," now here, and scheduled to leave August 25. The agents say she will take a full cargo, which they estimate at 7000 tons, she registering 4000 tons. Some conception of the River Plate trade in Argentine may be gleaned from a *résumé* of the steamers of their line scheduled for August sailings, which will carry cargo as given, viz.: "Basuto," August 10, 4500 tons; "Tropea," August 20, 6500 tons; "Endeavour," August 26, 3500 tons, and a steamer, August 31, to carry about 4000 tons. So far, these two new services, replacing their old established sail lines, seem to have met with favor. To keep pace with their increased business this house have been compelled to lease the entire street floor at 90 Wall street, in addition to the floor above so long occupied by them.

### Trade Items.

THE FARM AND GARDEN IMPLEMENT business formerly conducted by E. S. & F. Bateman, Greenloch, N. J., has passed into the hands of the Bateman Mfg. Company, and all accounts, obligations and contracts of the old house will be assumed and settled by the new corporation. This is a change in style only, the conduct of the business remaining in the same hands as heretofore.

STRANSKY & Co., 27 Murray street, New York, are manufacturing a Stove Mat for use on kitchen ranges, cook stoves, &c. It consists of a sheet of asbestos, circular in form, with a rim of tin, the whole article being 9 inches in diameter. The rim is kept in place by means of holes pricked in with a center punch. Instead of a wire ring riveted on with which to hang it up



when not in use, an eyelet sufficiently large is passed through the asbestos, thus enabling it to be packed closely for shipment. These Mats are placed on the top of cook stoves to keep milk, chocolate, cereals, &c., from boiling over or scorching, and can also be used for making toast.

SAMSON CORDAGE WORKS, Boston, have engaged as their direct representative C. M. Avery, who is well and favorably known to the jobbing trade. The company report their works in full operation, with a fair demand for goods for early shipment.

WILLIAM SCHNELL, formerly with the John Pritzlaff Hardware Company, has, with his father, started in the retail Hardware business at 990 Teutonia street, Milwaukee, Wis., the firm name being Geo. H. Schnell & Son.

THE HARDWARE STORE of B. C. Merrill, Winchester, N. H., was burned on the 28th ult. The loss is estimated at \$2000, on which there is an insurance of \$800. Mr. Merrill advises us that he will rebuild and resume business. He will be glad to receive catalogues, price-lists, &c., from manufacturers and jobbers in the Hardware line, as every book and circular in his possession was destroyed in the fire.

THE EIGHTH ANNUAL ENCAMPMENT of the Union Veteran Legion will be held in Cincinnati, October 11, 12 and 13, with headquarters at the Grand Hotel. Gen. W. H. Tucker of the Tucker & Dorsey Mfg. Company, Indianapolis, Ind., is the National Commander. The organization at present numbers upward of 20,000 members, composed of soldiers who enlisted previous to 1863 and prior to time of draft and bounty payments, and who served three years or were discharged by reason of wounds received in actual service. Most of those not wounded during their three years' service re-enlisted and served until the close of the war.

TRUMAN H. SCOTT has moved into his new Hardware store at Morristown, N. J.

IN THEIR ADVERTISEMENT in this issue the Atlas Mfg. Company, New Haven, Conn., illustrate their Bradley Steel Shelf Brackets, which they refer to as strong, light and artistic, and profitable to handle.

THE FIRM OF JOHN MERRY & Co., New York, who are well known to buyers of Sheet Metals, have been succeeded by the firm of Merry & Clark, importers of Tin Plates, Sheet Iron and Metals. Geo. E. Merry, who has for many years been associated with the old firm, needs no introduction to the trade. Elton W. Clark, the other partner, comes from the Wall street center, and, we understand, is a man of considerable ability and experience in foreign and domestic financial matters. It is the intention of the new firm to continue at 535 to 547 West Fifteenth street, New York, where old friends will receive a cordial welcome.

CORDLEY & HAYES, 172 Duane street, New York, sole agents for United Indurated Fiber Company of New Jersey, in announcing the total destruction by fire of the Lockport, N. Y., factory on July 29, say, under date of August 4, that they have already a force of men at work clearing the ground on a new location adjoining their old plant. This tract of 9 to 10 acres, recently purchased, they say will be partially covered by six new buildings, each averaging 50 x 200 feet in size, and their contracts call for the completion of them in 60 days. They assure the trade they are confident of being in a position not only to turn out goods within three

months, but in rebuilding have provided for a 50 per cent. added production, which will enable them in the future to be more prompt in the execution of orders.

HART & Co., Charleston, S. C., announce, under date of July 24, that "a very advantageous offer, as well as the desire to live North, induces us to wind up the affairs of the old Hardware establishment of Hart & Co. It seems proper after an existence of nearly a century to extend this farewell notice to our correspondents, with whom our intercourse has been so long and so pleasant." This business, we are informed, was begun in 1803, and ever since the name of Hart has been identified with it. They were importers and dealers in Hardware at the corner of King and Market streets.

JAMES H. FLAGG of the James H. Flagg Cutlery Company, who went to Europe in May last, combining vacation with business, returned on the "Paris," when she made her last westward passage in 6 days 9 hours 37 minutes, being the fastest on record this way, from Southampton to New York. The time given is from the Needles to Sandy Hook Lightship.

E. BISSELL, SON & Co., 12 Murray street and 15 Park Place, New York, will, on Thursday, August 17, conduct an important sale of Gray Enameled Opal Ware, Granite Iron Ware and Blue and White Ware, by order of the Lalance & Grosjean Mfg. Company and the St. Louis Stamping Company. As will be noted by referring to their Special Notice on another page, the goods will be sold in case lots, packed ready for shipment, and will consist of a complete line of Tea and Coffee Pots, Wash Basins, Tea Kettles, Convex, Berlin, Lipped and Climax Saucepans and Pots, Preserving Kettles, Dish, Milk, Pudding and Fry Pans, &c. A large line of Shoe and Cloth Brushes, first quality, will also be disposed of.

OUR READERS will observe among the Special Notices one signed "Hardware Buyer," in which the advertiser announces his desire to obtain the position of buyer or assistant buyer in a jobbing Hardware house. We understand that he has had a long experience in the Hardware line and is thoroughly conversant with the business.

SIDNEY SHEPARD & Co., Buffalo, N. Y., announce themselves as agents for the Cement Coated Wire Nails, which are sold by the Standard Wire Nail list. It is explained that the coating with which these Nails are covered causes a chemical action as the Nail is driven into the wood, which practically oxidizes it into its position, making it cling with great tenacity.

FRIEDR. DICK, manufacturer of Magnet Diamond Steels and Tools for butchers' use, in Esslingen, Germany, issues a notice that, owing to the increased demand for his butcher Tools in the United States, he has established a branch office in this country for the further convenience of his customers, and has made arrangements with John Chatillon & Sons, 85-93 Cliff street, New York, to act as his representatives. They will receive orders from the trade for direct importation at the same prices and terms as heretofore and will also carry these goods in stock.

THE MAIN BUILDING of the Empire Knife Company, West Winsted, Conn., was burned on the 4th inst. The origin of the fire is unknown. The total loss is about \$25 000, with insurance on machinery, building and stock of \$18,000. The company advise us that, fortunately, their brick stock building was

uninjured; and as it is their custom to keep a stock of finished goods far in advance of their immediate requirements, they desire to assure their customers that they will have no difficulty in filling all orders promptly. The factory will be rebuilt at once.

A DECISION was recently filed in the United States Circuit Court by Judge Coxe, in the suit of the Steam Guage & Lantern Company of Syracuse, and the R. E. Dietz Company of New York City, against the C. T. Ham Mfg. Company of Rochester, in which the court orders a decree against the defendant for an injunction and accounting. The court decides that the "feature which distinguishes the Higgins lantern from all preceding tubular lanterns is that the glass globe is mounted in a separate frame and tipped over from the burner laterally without disintegrating the tubular frame or the globe holding the frame of the lantern. No one had done this before. The advantages of the tilting globe over many, if not all, of the previous structures, are obvious; a number of inventors were seeking to secure these advantages, but Higgins was the first to do so by introducing this feature successfully into a tubular lantern. He is, therefore, entitled to protection."

## Manufacturing.

THE NATIONAL HANDY ARTICLE COMPANY have begun the manufacture of specialties at Grand Rapids, Mich. Among other articles, they are turning out the Security Dust Pan and the Duplex Mop Wringer. They use special machinery, and have equipped a factory at the corner of Louis and Campon streets. John L. Smith, formerly of the firm of Smith & Sanford, is secretary of the company.

THE HARTMAN MFG. COMPANY, whose works at Beaver Falls, Pa., have supplied to the trade the well-known Hartman specialties, have removed their entire plant to Ellwood City, Lawrence County, Pa., where from fully equipped new factories they will supply the trade with more promptness than ever before.

A JOINT STOCK COMPANY under the name of the Graham Mfg. Company has been organized for the purpose of purchasing and carrying on the business of manufacturing Keys and Locksmiths' Supplies which James Graham has heretofore conducted at West Haven, Conn. The business was originally established by Tuttle & Hotchkiss in 1866. A few years later the style of the firm was changed to the G. M. Hotchkiss Company. Mr. Graham bought out this company in 1888. The stock of the new company has been taken by Eugene H. White and others, Mr. White, who was formerly with Mr. Graham, being the treasurer and manager of the company.

THE REPORT which is going the rounds of the papers that hundreds of men are being laid off in the steel melting and rolling mill department at Henry Disston & Sons' Saw Works is not strictly in accordance with the facts. The rolling mill and steel melting department is running on part time, but the firm make it a point to do all the work they can in that branch of their business during the cold weather, so that if there is to be any lost time it is usual to have it during the hot season. In 1891 they closed that department for six weeks from July 1. Last year their stop was a little over two weeks. In May of this year their pay roll averaged \$19,000 to \$20,000 per week; last week it was a little below \$13,000.



## Hardwaremen in Congress

**T**HE COMPLAINT is frequently made that persons engaged in our commercial and manufacturing interests are seldom chosen as representatives to Congress. In sharp contrast with the rest of the country the city of Brooklyn has now two Hardware merchants among its Congressmen, whose portraits with a short biography we give herewith.

HON. WILLIAM J. COOMBS.

William J. Coombs was born at Jordan, Onondaga County, N. Y., December 24, 1833. He was prepared to enter Union College when between 13 and 14 years old, but was rejected by those in

been the policy of the concern to trade with a great many markets, so that when some were depressed others would still afford a lucrative business. The experience thus acquired, supplemented by his knowledge of the manufacturing and industrial interests of this country, led to a nomination for Congress from the third (Brooklyn) district in the fall of 1888. This nomination was made by independents favoring tariff reform, and was indorsed by the Democracy. Although failing of election he reduced largely his opponent's majority. In 1890 he was nominated and elected to the Fifty-second Congress from the same district. At the dinner of the Hardware Club last February, while responding to the toast "Trade and Finance," he stated that so far as he knew he was the only

with Sargent & Co., New York. Previous to the rebellion he served seven years in the New York State Militia. When war broke out he organized Company A, Fifth New York Heavy Artillery Volunteers and served as its captain, under the command of his father. In time he was promoted to the rank of major and later was breveted lieutenant-colonel for "gallant and meritorious conduct" at Harper's Ferry and in the famous Shenandoah campaign. He was taken prisoner in 1862, but was paroled, and later in the autumn of the same year was exchanged. On January 1, 1870, the firm of Graham & Haines was formed, which existed until May 1, 1884, when the style was changed to John H. Graham & Co. The house have always done business as agents for American Hardware manu-



HON. WILLIAM J. COOMBS.



HON. JOHN H. GRAHAM.

charge on account of age. Turning his attention to business, first as a clerk in Jordan and afterward in Syracuse, he thus spent the intervening time until 1849, when he came to New York to take charge of a dry goods establishment. In 1854 he began to export American Hardware (which then was limited to a few articles sent abroad only on account of their superiority), believing that native ingenuity and enterprise would ultimately compete successfully with European makers. In 1870 he established the firm of Coombs, Crosby & Eddy, a copartnership that was renewed eight times, until on January 1, 1891, a stock company was incorporated under the title of Coombs, Crosby & Eddy Company, of which he is the president. When the business was inaugurated in 1870 the house immediately sent travelers to many parts of the world to introduce American productions and establish commercial relations. It has

merchant a member of the Fifty-second Congress. Last fall he was again elected to the House of Representatives, now in session, from the fourth district. Mr. Coombs has been instrumental in originating and having made into law much important commercial legislation.

HON. JOHN H. GRAHAM.

John H. Graham was born April 1, 1835, and is the son of Gen. Samuel Graham, who came to the United States from Belfast, Ireland, in 1835. The subject of this sketch was educated at Public School No. 4 in Brooklyn, and has always resided there. After leaving school he served an apprenticeship for five years with an architect and builder. Abandoning this occupation he began his commercial life in 1853 with White & Knapp, retailers of Hardware, at the corner of Fulton and High streets, Brooklyn. In September, 1854, he obtained employment

facturers, they now representing, we are told, something like 80 such concerns. He has occupied many honorable positions in public and private life. During 1857-1859 he was deputy commissioner of repairs and supplies under the municipal government of Brooklyn, and for 17 years was a member of the Democratic General Committee. He was the representative of the New York Hardware Board of Trade in the World's Fair Commission of 100, and was named as one of the incorporators in both the State and National bills which contemplated locating the exposition in New York. He is a trustee in the East Brooklyn Savings Bank and a director in the National Shoe and Leather Bank. In November, 1892, he was elected to the House of Representatives from the Fifth Congressional District, Brooklyn. He was also nominated as a Presidential elector in the autumn of 1892, but resigned, owing to doubt as to eligibility on account of a national bank directorship.

# Prize Competitions.

## Prize Competition No. 27 (Reopened).

SUBJECT:

### Local Associations of Merchants.

This competition closed July 8, but in view of the exceptionally few replies which have been received from the trade and the importance and practical nature of the subject, we reannounce it as above, and extend the time up to which responses will be accepted to September 16.

The formation of local associations has been found feasible in many places for the purpose of securing more friendly relations among competitors and reaching an understanding in regard to matters of common interest. Among the good results referred to as coming from such associations are the following: Overcoming petty jealousies; cultivating a spirit of fraternity; listing of undesirable customers; an understanding in regard to time of presenting bills; putting in operation early-closing movements; agreement as to the prices at which goods are to be sold; mutual accommodation in supplying goods which one merchant may be temporarily short of, &c. The subject is thus evidently a broad one and of a good deal of practical interest. In discussing it the following points are suggested:

Whether it is desirable to have such associations;

How such associations may be organized;

The objects to be accomplished by them.

It will also be of interest to have any information in regard to the practical working of such associations.

This competition will remain open until September 16, 1893.

Those intending to compete are reminded that it will not be necessary to write long essays, but that comparatively brief and business-like answers will be favorably regarded as meeting the purpose for which these competitions are announced.

The following prizes will be awarded:

First prize.....	\$12.50
Second prize.....	7.50
Third prize.....	5.00

The prizes will be awarded for answers which, in the judgment of the Committee of Award, are most suitable for publication and of the most general interest.

The committee to whom the papers in Competition No. 22 were referred have awarded the prizes as follows:

- First prize to A. H. HOPE.
- Second prize to CHAS. S. COOM.
- Third prize to W. F. VAN WINKLE.

## World's Fair Exhibits.

THE ABBOTT MACHINE COMPANY, 47 and 49 South Canal street, Chicago, made an exhibit of their Ideal bread and cake Knives in the gallery of the Manufactures Building in the north-east section. These Knives have flexible toothed blades, made from refined sheet steel, tempered throughout alike, and are fitted with neat metal handles. The cutting edge of these Knives is described as formed on a series of curves of outward convexity, and can easily be sharpened with a common whetstone or ground on a flat-faced grindstone.

THE CHELSEA FILE WORKS of Norwich, Conn., have made no formal exhibit of their goods, but specimens of the Chelsea Rasps are shown in the War Department in the Government Building. These Rasps have met with favor at the hands of Chief Farrier Kernan of the United States Army and were thus included in the Government exhibit. The Chelsea Rasps are exclusively hand cut and made either tanged or with improved round ends.

E. C. ATKINS & Co. of Indianapolis, Ind., exhibit in Machinery Hall, Section 14, their Saws in a large glass case, with five huge vertical cylinders constantly in motion. Each cylinder is covered with specimens of the firm's products. One is devoted entirely to Band Saws, which are arranged spirally around it, running from  $\frac{1}{8}$  inch to 8 inches wide. Another is devoted to Cross-Cut and one-man Saws. A third is used to exhibit Hand Saws exclusively, showing a very great variety of patterns. The fourth has Gang, Drag and Mulay Saws, arranged vertically. The last is the center and is about 8 feet in diameter. It has on it two 88-inch Circular Saws, the largest ever made for actual work. The column is also covered with a variety of segment, inserted tooth and all other kinds of Circular Saws. The firm are said to be the only exhibitors of Stave Saws, which are shown mounted, and attract a great deal of attention. Saw mill specialties are also shown, such as Dogs, Gummars, Swages, brazing plant for brazing large Band Saws and other tools required in the equipment of modern mills. In several flat show-cases are exhibited smaller specialties, such as Saw makers' Tools, Hammers, Swages, Dressers, &c. A new Cross-Cut Saw is shown, which has but recently been brought out. It is made in the shape of a segment of a circle, with a thin back, tapering to greater thickness at the ends, so that the Saw will clear itself easily and not pinch, while the handles are brought down as nearly as possible on a line with the cutting edge, giving greater power to the stroke.

THE CHAMPION IRON COMPANY of Kenton, Ohio, make quite an elaborate display of ornamental cast iron work. The goods shown consist of Lawn Settees and Chairs, Iron Stairways in artistic patterns, with richly decorated newel posts and railings, large Columns with highly decorated bases, plinths and capitals, sections of ornamental Fencing and a variety of other work for architectural purposes. Some of the Stairways shown are finished in electro-bronze, which brings out the fine effects of elaborately molded work most admirably. Quaint figures are shown designed for use as Hitching Posts. The company make 165 designs of ornamental Fences and Veranda Railings. They also make a jail display in the Anthropological Building, exhibiting Cells made of their five-ply hardened steel. The arrangement of the Cells is such that prisoners can be turned into a corridor extending along the Cells, but equally secure with them.

A lock box on the exterior enables the jailer to lock or unfasten the Cell doors without entering the corridor. When erected for use these Cells also have floors and ceilings of five-ply steel plates. Cages of this kind can be placed in jail buildings already erected. They are furnished in any size desired.

BUFFALO SCALE COMPANY of Buffalo, N. Y., make a very large exhibit in the Manufactures Building of their Scales and Weighing Machines. The goods shown were taken directly from the factory and were not prepared specially for the exposition, yet, taken as they stand, they make an excellently fine showing. There are a large number of portable and dormant Scales of various sizes. Among the portable Scales are large sizes for use in rolling mills. A special machine shown is a reverse-acting meat Beam for butchers' use, which takes the place of the old-fashioned Steel Yards. There is also a single track suspension Butchers' Scale, the double track not being shown for lack of a place to which to fasten it. On a large table in the center of the space are a great variety of grocers' and other counter Scales. A new device brought out in connection with these Scales is an automatic weight to balance the scoop. This consists of a metal ball in an oscillating frame, which automatically changes its position when the scoop is on or off the platform, so that weighing can be accurately done in either case without the attention of the operator. The company also exhibit a patent testing machine for testing cast iron, which is in extended use among foundrymen. They further display working portions of their railroad Scales.

KIRK & BAILEY of Cincinnati exhibit their Quick Edge Grindstone, which is a tool especially adapted to the use of mechanics, owners of small shops or farmers who must use manpower. The Grindstone is set in a frame with a double treadle, for both feet, the cranks being placed opposite each other to avoid centering. A seat is provided in front for the operator and a drip cup is fastened on the opposite side of the stone. The frames are collapsible and when folded occupy a very small space.

THE SPRINGER TORSION BALANCE COMPANY, 92 Reade street, New York, make a remarkably fine exhibit of their counter Scales, comprising jewelers', chemists', druggists', grocers', and other Scales, handsomely finished and placarded with statements showing the degree of sensitiveness of each Balance. The peculiarity of the Springer Balance is that the usual "knife edge" is replaced by thin steel springs stretched tightly between bearings, the center of the beam being fastened to the center of the strained spring and at right angles to it. Through the elasticity or torsion of the spring the beam vibrates in the same manner as upon knife edges. The pans rest upon similar torsion springs at the ends of the beams. The accuracy which is thus secured is shown by the company's analytical Balances which are sensitive to  $\frac{1}{4}$  mg., and prescription Balances sensitive to  $\frac{1}{16}$  grain. The rider beam of the prescription Scale is graduated on the upper edge in grains, and on the lower edge in the metric system. The exhibit is located in the Manufactures Building.

GRAND RAPIDS REFRIGERATOR COMPANY of Grand Rapids, Mich., together with the Northern Refrigerator Company of the same city, make a very handsome display of the Leonard Cleanable and the Glacier Refrigerators in the Manufactures Building. Their space is inclosed by an open frame work of oak and brass. Around the top are

brass letters attached to fret work panels. The exhibit consists of a great grocer's Refrigerator, restaurant Refrigerators, large and small, domestic Refrigerators, beautiful Sideboards, florist's Refrigerators, &c., the entire exhibit comprising some 16 samples. The announcement is made that all these goods were taken from regular stock and not manufactured for exhibition purposes. Nevertheless, they are exceedingly handsome, and thus demonstrate the superior workmanship which is the standard set up by these companies. All are made of hard wood and are elegantly polished and finely carved. The Hardware used is of the makers' special designs. The hinges are of open work in solid brass, while the locks are solid brass, with double lever catches which fasten the doors at the top and bottom as well as in the center.

J. R. BRYANT & Co. of Crawfordsville, Ind., exhibit numerous specimens in Galvanized Iron and Copper of their Crest Tile Conductor, a combined cresting, ridgeboard and electrical conductor. This is made of a sheet of metal folded flat to form the top, while the sides are widened and shaped to fit the form of the comb of the roof. The cresting thus made extends some 6 inches above the roof and is cut in ornamental patterns.

THE NEW JERSEY WIRE CLOTH COMPANY of Trenton, N. J., make a very practical exhibit in the Manufactures Building. They have erected on a portion of their space a small building, with floors, walls, partitions and ceiling constructed with wire lathing. The floor is laid on steel beams, covered with wire lath, and consists of concrete, which is as firm and substantial as though it were brick laid on solid earth. On one side is a wire brick partition, with a portion uncovered by plaster. The same method is followed in showing the construction of a solid hard plaster partition on wire lath, a fire-proofed column on corrugated wire lathing, a fire-proofed column on patent stiffened wire lathing, and a stud partition with the same kind of lathing. Grouped inside, on top and round this structure are rolls of Wire Cloth, Poultry Netting, Fencing and other fabrics of woven wire. An exhibit is made of fire-proof scenery for theaters, the curtain being made of Wire Cloth, as well as the accessories. On these have been painted in oil designs and landscapes of a high order of merit, illustrating their perfect adaptation to this purpose.

UNITED INDURATED FIBER COMPANY, Eastern agents, Cordley & Hayes, New York, and Western agents, Indurated Fiber Ware Company, Chicago, are located in the Forestry Building. Their display consists of a pavilion built up largely of indurated fiber goods. The pillars supporting the roof are made of Bowls, Pails, Basins and Tubs, while the electric lights between them are shaded in Funnel of the same material. All about the display the eye is arrested by an article of indurated fiber put to some such extraordinary use. Besides the make-up of the pavilion, a large variety of other articles are displayed about the counters. A notable article among the variety of goods is a Bath-tub made by the Oswego Indurated Fiber Company. Altogether about 100 different articles are exhibited, which show the wide application of this material. The exhibit is in charge of Homer Drake.

CENTRAL IRON & STEEL COMPANY of Brazil, Ind., make a very good display of Turn Buckles, including a very wide range of sizes, from the very large Buckles used for bridge work to small specimens for comparatively light work. The railing inclosing this ex-

hibit is appropriately made of short pieces of iron bars alternating with Turn Buckles. The exhibit is located in the Manufactures Building.

THE AUSABLE HORSE NAIL COMPANY, 4 Warren street, New York, are located in the Manufactures Building, where they make an exhibit of their Horse Nails in connection with the display of Horseshoes made by Prof. Wm. Russell of Cincinnati. The Ausable Horse Nails are hot forged and hammer pointed and finished. Not only are boxes of these Nails shown, but also parts of rods with partly finished Nails attached, to indicate the quality of the metal of which they are made. A velvet-covered card is decorated with highly finished samples of the different sizes made by this company. In upright cases are shown a good number of Horseshoes of curious patterns, made by Professor Russell to correct irregularities in horses' gaits as well as to cure diseases of the hoof or feet. Parts of horses' hoofs are also exhibited, to show the ailments of that part of the horse which are corrected by proper shoeing.

THE WM. D. GIBSON COMPANY, 61 to 69 North Jefferson street, Chicago, make an exhibit in Section P, Manufactures Building, of Spiral and Flat Springs in great variety, for all kinds of machinery, Upholsterers' Springs and Springs for agricultural machinery and bicycles. The display is arranged on a square platform, with shelves above, which recede somewhat in the form of a pyramid. The space on both shelves and rises is thus brought into use for the exhibit of goods. Most of the springs shown are beautifully nickel plated.

THE DAVID MAYDOLE HAMMER COMPANY of Norwich, N. Y., make a simple, yet elegant, display of their Hammers in the Manufactures Building. They have a good sized space, inclosed by a nickel-plated tubular railing. The Hammers are arranged in an ornamental upright case. A portrait of the founder of the works is placed in the center, and around it are grouped all sorts of Hammers, handled ready for use. In making the circles the handles point toward the center, while the heads form the circumference.

MILLER LOCK COMPANY of Philadelphia exhibit in an upright cherry case in the Manufactures Building specimens of their non-pickable house Locks, with 10,000 key changes, keyless Deed Boxes, keyless door Locks, Lock Boxes for post office use in different sizes, and a great variety of their Padlocks. In connection with these Padlocks the statement is given that 1,000,000 key changes are made. In the same case diplomas are exhibited which were received at previous exhibitions.

M. B. SCHENCK & Co. of Meriden, Conn., in the Manufactures Building make a fine display of their Yale Double-Wheel Casters, Gem Ball-Bearing Casters, and Rugby Fox Stem Casters for furniture, trucks, and everything that needs a caster. Many are shown attached to bases of furniture legs. Others are fastened to an upright frame. Some are screwed to a table top, wheels up, to show how the bearings work. Circular table tops are exhibited with a large number of short legs all castered. The collection practically covers all the sizes and styles made.

BLOUNT MFG. COMPANY of Boston exhibit the Blount Door Check and Spring, the Standard Door Stop and the Blount Automatic Sash Lock in their space in the Manufactures Building. The Door Check and Stop are shown attached to doors, hung for this purpose. One of them is in-

tended for use on car doors, being so arranged that the Check is thrown out when the door is nearly closed, giving full power to the Spring, so that the door is shut despite the motion of the car or a strong current of air. The Check and Spring are so easily adjusted that they can be made to suit any changes arising in the fitting of the door, summer drafts, &c. Socket joints are used to prevent the Check from getting out of order by doors sagging. The Check can be used on either side of the door, or right or left. The Door Stop is attached to the bottom of a door and is operated by the foot, holding the door at any angle desired without injury to carpet. It has a rubber end; so that it will operate on a tiled or smooth wooden floor as well as a carpet. Five sizes of the Check are made and two sizes of the Stop.

THE NORTON DOOR CHECK & SPRING COMPANY of Boston, Mass., exhibit in the Manufactures Building specimens of their well-known Check and Spring attached to doors of the usual size, handsomely made and hung in fine frames, presenting an attractive appearance. The Norton Check is operated by the cushioning of the piston on air, which brings the door to a stop for an instant near the jamb, then quietly, but surely, closes the door. The greater the force exerted to close the door the greater resistance is offered by the Check, as it compresses the air in the cylinder. The Spring, on the contrary, draws the hardest when the door is nearest closed.

SHERWOOD MFG. COMPANY, Buffalo, N. Y., exhibit their line of Buffalo Automatic Injectors, Sherwood Double-Tube Injectors, Buffalo Glass Oil Cups, Sight Feed Cylinder Lubricators, Improved Compression Grease Cups, Improved Ball Gauge Cocks, Duplex Boiler Tube Scrapers, Favorite Steam Flue Blowers, Hand Cylinder Oil Pumps and Automatic Cylinder Oil Pumps. Some of their goods are shown on a revolving pedestal which is turned by an automaton representing Uncle Sam, who turns the pedestal with a bicycle arrangement attached to his feet and a belt running to the pedestal, operating one of their Duplex Boiler Tube Scrapers with one hand and one of their Automatic Cylinder Oil Pumps with the other. This makes quite a unique and attractive exhibit. The company's location is in the Main Machinery Building, Section 25. Column K-24-25.

THE BAACKES WIRE NAIL COMPANY of Cleveland, Ohio, in the Manufactures Building, make a unique exhibit of Wire Rods, Wire, Wire Nails and Barb Wire. Two columns, in the shape of huge Wire Nails, stand in front, with heads down and points up. They are wound spirally with blue velvet to which are attached all sizes of Wire Nails, beginning with Spikes at the bottom and terminating with Brads at the top. These Wire-Nail columns and two plain Wire-Nail columns in the rear support a large purple-blue hoop, the registered trade-mark of the company. In the central front stands a hexagonal pyramid completely covered with Wire Nails laid on full length, large Nails at the bottom and small Nails at the top. This pyramid is flanked with coils of Wire Rods. On a platform in the rear are kegs of Wire Nails in the center, with coils of plain and galvanized Wire piled up on the right and left. On a still higher platform, further back, are spools of painted and galvanized Barb Wire, set on end, making a good background for the whole display.

THE GILBERT & BENNETT MFG. COMPANY, Georgetown, Conn., New York and Chicago, are distributing a souvenir, this being the seventy-fifth

anniversary of the company. Views are given of their exhibits located in the Manufactures Building, section Q, block 3, and in the Horticultural Building under the dome; also, of their factories, stores and offices. A portion of the book is devoted to an interesting explanation of Netting and Fencing.

THE PUTNAM NAIL COMPANY of Boston are located in the Manufactures Building, where they exhibit in a neat pavilion numerous specimens of their hot forged and hammer pointed Horse Nails. They are displayed in cases, with the different sizes assorted in separate compartments. The city head Nail is displayed in heaps piled on a red cloth background. In a large frame, on a brass plate, are shown specimens of Nails in different stages of manufacture. A case full of Horseshoes of many patterns, made by Cornelius Desmond of Pittsfield, Mass., is also shown.

RHODE ISLAND PERKINS HORSESHOE COMPANY of Providence, R. I., make a fine display of their Horse and Mule Shoes. The central piece in this exhibit is a large showcase with a flat compartment below and an inclined case above, both of which are filled with Shoes of a great variety of styles and sizes. On top of the case stands a huge gilt Shoe, which in turn supports an eagle with outstretched wings. In the center of the large Shoe is the Rhode Island coat-of-arms. The sides of this case are covered with velvet and samples of different kinds of Shoes are attached. Among them are Shoes of special design, both with permanent and movable calks. On a large frame at one side of the space are arranged a large number of Shoes in the form of a Maltese cross. Specimens are also exhibited of Horseshoe Calks and Horseshoe Bars creased after their passage through the rolls and before they are cut in Horseshoe lengths. The Horseshoe Bars rolled by this company are wide enough for a double row of Shoe blanks. The Bars are creased so that the Shoe lengths alternate on each side, thus bringing the wide part of a Shoe opposite the points of two others, economizing scrap. The exhibit occupies space in the Manufactures Building.

KEEN & HAGERTY of Baltimore, Md., have arranged their exhibit of pieced and stamped Tinware on a large rack with shelves on both sides, as their space is narrow, with an aisle on both front and rear. The display is arranged effectively, comprising a large number of kitchen utensils, decorated Bath-tubs, decorated Chamber Sets, Oil Tanks, hospital specialties, Water Coolers, &c. They manufacture the Columbian Rotary Steel-faced Nutmeg Grater, the Columbian Pie Plate with a corrugated bottom, the Wagandt soldering system and other specialties.

THE UNITED STATES WIRE MAT COMPANY of Decatur, Ill., display their products in a glass case of special design, with large plate-glass sides and a plate-glass roof. In this a great variety of Wire Mats are shown in rolls and flat. The peculiarity of the Decatur Mat is that it is composed of separate links, so that it can be almost as tightly rolled as a piece of carpet. This flexibility is a feature that makes the Mat accommodate itself to inequalities in a floor, so that it will always lie perfectly flat and yet will not curl up at the edges. It is made in any length and any width. When furnished in rolls of long lengths, pieces can be cut off as desired, thus avoiding the necessity of a jobber carrying in stock a great number of separate Mats of various sizes to accommodate his customers. The company are exhibiting in the Manufactures Building.

## Prominence of American Agricultural Implements Abroad.

W. C. BARKER, 69 Beekman street, New York, who conducts the export business of a number of Agricultural Implement manufacturers, has returned from a six months' tour of Europe. He visited the leading houses handling the goods represented by him in 17 countries, including the United Kingdom, France, Germany, Italy, Spain and Portugal, not, however, Russia, which was canvassed in a five months' journey the preceding season. A thorough tour of almost every European country has convinced him that the exposition at Chicago is going to draw a great many representatives of importing firms handling this class of goods. The result of his observation is that of the concerns he visited about 90 per cent. will have a representative in this country attracted by the great fair. Alluding to the preceding trip, when much time was spent in Russia, Mr. Barker referred to a statement made to him by His Excellency V. V. Tschernieff, Inspector of Agriculture, to the Minister of Domain, at a dinner in St. Petersburg, in the winter of 1892, a memorandum of which he had preserved. According to this official, the total consumption in Russia of this class of farm implements amounted to \$10,000,000, of which \$6,000,000 was imported. Of the \$6,000,000 imported \$4,500,000 were made in America, the remainder being about equally divided between England and Germany. Alluding to this progressive Russian, who died January 10 last, he said 25 years of his life had been spent in the public service, he having commenced his governmental career in December, 1867. He was especially friendly to America, having visited this country much in the interest of his department. His best thought and energy has been devoted to the improvement and advancement of the peasantry. About 17 years ago he originated the idea of what has since developed into an institution known as the Imperial Agricultural Museum at St. Petersburg. This museum is maintained by the Government, and its function is to obtain the newest labor-saving devices used in tilling the soil. Machinery is secured from time to time, and experimented with and tested by experts. Such as is suitable for that country is brought to the attention of those having use for it. Different soils are analyzed and what each soil will best bear is recommended. While on a train in Southern Russia, entering into a conversation with a fellow traveler, Mr. Barker was informed by his new-found acquaintance that he was a raiser of farm products, and in discussing the size of farms said that his was comparatively a small one, having but 18,000 dessatins (a dessatin equals about  $2\frac{1}{2}$  acres), while some of his neighbors had tracts under cultivation aggregating 20,000, 40,000 and even 60,000 dessatins. Here Mr. Barker said there was a great opening for any one who could develop a suitable portable farm engine capable of using petroleum to generate motive power, by converting

it into gas or otherwise utilizing it. Coal is expensive to handle and water, during the hot season, scarce or unobtainable, while petroleum can be delivered approximately for about 1 cent a gallon in quantities. Enough water usually falls in the spring before the approach of the hot season to nourish and mature the grain. Some of this top soil in the bottom lands reaches to a depth of 8 or 9 feet, the grain often rooting 5 or 6 feet deep in consequence of the moisture absorbed earlier and retained. When the surface water is scarce, later, the only way to get a supply is from artesian wells, which are expensive to bore. Of course, in such large tracts the machinery must go to the grain.

## Rope Manufacturers' Meeting.

A MEETING of the Rope manufacturers of the United States is being held at the time of going to press at the offices of the John Good Company, New York, in response to a call sent out by John Good, president of the company. The stated object of the meeting is the forming of an association for mutual protection in the purchase of raw material, and in the price of manufactured products. The factories represented cover the territory from Maine to California, and are largely of those manufacturers who have heretofore worked independently of the old Cordage Company.

GEN. TEODOSIO CANTO of Yucatan, near Merida, the owner of 21 farms and a large grower of sisal hemp, is now in the United States both to see the World's Fair and for the purpose of placing his two sons in Amherst College. While in Springfield, Ohio, last week he left orders with the O. S. Kelley Company for six corn mills and two portable engines. General Canto raises about 1000 bales of sisal hemp per week the year through. He is an ex-Governor of Yucatan and stands very high in the esteem of President Diaz and other Federal authorities. He is exceedingly friendly to the manufactures of the United States. J. B. Cartmell of the O. S. Kelley Company, Springfield, Ohio, was a member of the manufacturers' excursion to Mexico last spring. Besides this sale to General Canto he reports orders from one firm in the City of Mexico for corn mills since his visit to the amount of \$1500.

GRISWOLD MFG. COMPANY of Erie, Pa., make an admirable display of their Erie hollow ware. Large upright showcases surround three sides of the space. In these cases are arranged highly polished specimens of Skillets, Pans and Pots, also Waffle Irons in several sizes, Cake Bakers of many patterns, Broilers, Lid Lifters in numerous designs, Iron Holders, Mail Boxes, &c. Nickel plated Skillets are displayed in separate compartments in the front of the other cases. The extreme top is bordered with cold-handled Tea Kettles, some galvanized and others tinned. A sign composed of miniature Skillets stretches across the rear of the top. The railing in front is composed of miniature Tea Kettles strung on chains. Columns on each side of the entrance support nickel plated fire sets, consisting of a stand with Shovel, Coal Tongs, Poker and Brush. The display is made in the Manufactures Building.



## Brazilian Steamer Service.

**PAUL F. GERHARD & CO.** have been appointed freight agents of the Lamport & Holt Line, in connection with Brazilian business, and hereafter will have charge of matters pertaining to outward freights. All freight engagements from the United States to Brazilian ports will be made by them and permits, bills of lading, &c., will be issued from their offices, Kemble Building, 19 Whitehall street, New York. It is the intention to dispatch steamers at regular semi-monthly intervals from Martin's Stores, Brooklyn, for Pernambuco, Bahia, Rio de Janeiro and Santos, commencing August 1 with the steamer "Wordsworth." Additional sailings will occur as circumstances may warrant. This is an old established line, now operating steamers from Liverpool and Antwerp to South American ports in Brazil, the River Plate and on the West Coast. The practice has been on arriving at ports in Brazil to load them with coffee, hides, &c., for New York, and thence with grain or other cargo for Europe. It is the intention now to keep certain steamers plying both ways between this and Brazilian ports. The sailings so far announced are: Steamers "Galileo," August 15, and "Coleridge," September 1. These will carry first and third class passengers. Merchandise will be taken on through bills of lading for Maceio, Victoria, Parangua, Santa Catharina, Rio Grande do Sul, Pelotas, Porto Alegre and Coast Ports. Busk & Jevons are the general agents, Produce Building, New York.

## Dishonoring Drafts.

**THE DISCUSSION** in regard to the payment of bills by local checks has called attention to the matter of dishonoring drafts for accounts which are overdue. The usual practice in this matter is to send advices that on a given date in the near future the draft will be made for the amount, with sufficient time intervening to permit the person on whom the draft is made to remit or ask that the draft be not issued. Many merchants prefer to remit for their accounts rather than be drawn upon for the amount, and in the ordinary course of business payment is frequently made before the date named for the draft. In case the merchant is not in a position to honor the draft an opportunity is given to request that it be withheld, and this is the business-like course in the premises. Simply ignoring the notice and dishonoring the draft is annoying and unbusiness-like. Touching on this subject we give the following letter from a prominent manufacturer in New England:

By far the worst grievance manufacturers have is the dishonoring of sight drafts for past due accounts after notice has been given on statement first of the month. Most manufacturers deposit sight drafts as cash, their bank charging 25 to 50 cents each, according to amount, so it is both trouble and expense to draw. Exchange is now sel-

dom added, so there is no expense to customer. Still, many will dishonor. A postal asking that the draft be withheld is certainly the least the debtor could do if he cannot or will not pay bill that is past due. The manufacturer is willing to be put to expense of drawing on customer, as he probably needs the money to pay his workmen, but to be to the expense needlessly and have draft that should be paid dishonored is aggravating in the highest degree. To speak plainly, it is an imposition on the part of the customer that is entirely unnecessary and inexcusable.

## Bindley Hardware Co.'s Catalogue.

**THE BINDLEY HARDWARE COMPANY**, 33-43 Seventh avenue, Pittsburgh, Pa., have issued a comprehensive catalogue of 938 pages, bound in cloth and leather. An illustration of their building on the first page is followed by a plan of the first floor, showing the location of the offices, salesroom, &c. A well-arranged index makes reference to the different lines of goods an easy matter, while the illustrations and list prices embrace such goods as are carried in stock. The line of goods covered include Builders' and Shelf Hardware, Mechanics' and Machinists' Tools, House Furnishing Goods, Cutlery, Plated Ware, Blacksmiths' Supplies, Firearms, Garden and Farming Tools, Road Machinery, &c. The book is fully illustrated, the cuts showing clear and distinct, printed on a fine quality of paper. In compiling the catalogue it has been the aim of the company to set forth its contents in a clear, concise and practical manner, enabling customers to order such goods as are kept in stock by numbers, thus insuring prompt execution of their orders.

## Price-Lists, Circulars, &c.

**THE MERIDEN SILVER PLATE COMPANY**, Meriden, Conn., and New York: Staple Goods and Novelties. Their illustrated catalogue and price-list shows Tea Sets, Hotel Ware, Syrup Cups, Butter Dishes, Baking Dishes, Tilting Sets and Ice Pitchers, Waiters, Crumb Trays and Scrapers, Cake Baskets, Fruit and Berry Dishes, Casters, Shaving Cups and Brushes, Inkstands, Cigar Boxes, Brushes, Mirrors, Combs, &c.

**SCHOVERLING, DALY & GALES**, New York: Sporting Goods. Their illustrated catalogue and price-list 93B describes Firearms and Sporting Sundries for the trade. Attention is called by the firm to the fact that hereafter catalogues of spring and fall goods will be issued in two sections and designated A and B, respectively. A trade price-list, No. 4, applies to 93A and 93B 1893 catalogues and Bicycle catalogues, which correspond with the illustrated books page for page. This is small in size and convenient for pocket use.

**NATIONAL MFG. COMPANY**, Worcester and Boston, Mass.: National Standard Wire Goods. A catalogue illustrates Steel Wire Broilers, Toasters, Culinary Forks, Egg Beaters, Potato Mashers, Skimmers, Pot Stands, Strainers, Sponge Baskets, Wire Easels, Sifters, Dish Covers, &c.

## It Is Reported—

That F. C. George of Lilly, Pa., and Charles E. Chapple of Johnstown have formed a partnership and opened a store in the latter place, where they will sell Stoves, Ranges, Furnaces, &c.

That the Thomas Hughes Hardware Company have succeeded the old established Hardware firm of Hughes, Stevens & Co., Tucson, Ariz. The new company have a capital of \$50,000. Thomas Hughes will act as manager of the business, and S. Morrison as secretary.

That Wilson & Sutherland, Hardware merchants, Tekamah, Neb., are taking an inventory of their stock, and expect soon to resume business. Mr. Wilson is the present treasurer of Burt County, and Mr. Sutherland represented the county in the State Senate in 1889.

That Burton & Butler will open a new Hardware store at Benton, Ind., about August 10.

That Ferry & Green, Hardware dealers, Medway, Mass., have dissolved partnership. Mr. Green will continue the business at the old stand.

That Voss & Koenig have succeeded Voss & Stumpf as retail Hardware dealers, Milwaukee, Wis.

That John H. Weinsheimer, for many years with Philip Gross, has entered the retail Hardware business in his own name at Fifteenth and State streets, Milwaukee, Wis.

That O. E. Dudley and E. C. Born, formerly connected with the Warren Hardware Company, Warren, Ohio, have formed a partnership and will engage in the Hardware and Tin business at Ashtabula Harbor.

That the Hardware store of Hildebrand & Fugate, Indianapolis, Ind., was burglarized on the 18th ult.

That the Hardware store of M. Nelson, Buffalo, Minn., was destroyed by fire on the 18th ult. Loss, \$3500; slightly insured.

That Sanborn & Robinson, Hardware merchants, Lawrence, Mass., are now occupying the second floor of their building in connection with the main floor. They have also built a wooden structure in the rear.

That Hudson & Godfrey, Hardware dealers, Detroit, Mich., are selling out their Hardware business.

That the Beverly Hardware Company, Beverly, Mass., are closing out their stock.

That burglars entered A. C. Witte's Hardware store at Aberdeen, S. D., on the 16th ult., and stole \$400 worth of fine Razors, Revolvers, Cutlery, &c.

That Bartholomew & Withroft's Hardware store at Maxwell, Cal., was burned out on the 11th ult.

That the Hardware store of R. R. Teel & Bro., Terre Haute, Ind., was visited by thieves on the 18th ult.

That the Hardware store of Lamson & Robinson, Marlboro, Mass., was damaged by fire on the 21st ult. Loss, \$4000; fully insured.

That the store of J. M. Paige, dealer in Hardware, &c., Naugatuck, Conn., was destroyed by fire on the 24th ult.

That W. E. Penniman, Hardware merchant, North Adams, Mass., has taken possession of his new store. The store is one of the handsomest Hardware establishments in Western Massachusetts, and is very conveniently arranged throughout.



## Paints and Colors.

*It should be understood that the prices quoted in this column are strictly those current in the wholesale market, and that higher prices are paid for retail lots. The quality of goods frequently necessitates a considerable range of prices.*

There have been evidences of some favorable reaction from the late stagnation in the market for the general line of Paints and Colors, but the turn is comparatively slight and nothing more than what should naturally follow a period of almost decided inaction. In other words, there are no signs yet of the free buying that would betoken radical change in the consumptive demand, or greater confidence on the part of distributors. The fact that the depressing influence of generally adverse trade conditions has little effect upon values is a source of some gratification and encouraging to the idea that matters are not only shaping for a fairly good business during the autumn season, but that a lively trade will be experienced as soon as the monetary stringency shall have been relieved.

**White Lead.**—The reports as to general distribution differ in some degree from those of the preceding two or three weeks to the extent of reflecting a somewhat better movement, but the best accounts do not warrant a stronger statement than that business is fair for the season. Low prices for raw material and the irregularity in Lead Trust shares on the Stock Exchange have, apart from the condition of general business, more or less restraining effect, but lower prices than those that were reached last month have not been accepted for any of the various productions of corrodors or other manufacturers and to that extent the market has retained remarkably good form despite the various drawbacks.

**Red Lead.**—While not large numerically or in the aggregate amount, dealings have been somewhat freer, particularly of foreign brands, some of which were parted with to grinders at  $\frac{1}{8}\phi$  @  $\frac{1}{4}\phi$  under the list prices for American. The claim is made that American product is not positively lower, but the market is, nevertheless, a poor one from top to bottom and sales are admitted to be slow.

**Litharge.**—Aside from the usual demand for small lots for prompt delivery there is hardly any movement. Occasionally some interest in future deliveries arises, but the negotiation is almost invariably at prices that stand in the way of business, since large consumers are disinclined to place orders except at very much lower prices than those generally asked.

**Orange Mineral.**—There has been no change in the character of the demand for French makes for prompt or for future delivery. Prices remain unchanged and sales are moderate. German makes are pushed for future delivery at prices ranging from  $7\frac{1}{8}\phi$  to  $7\frac{1}{4}\phi$  for round lots. There has been only a moderate call for store parcels. Domestic makes, while not active, are receiving a fair share of attention and sell in moderate quantities at old prices.

**Zincs.**—American Oxide is finding irregular sale, and the trying conditions existing tend to strain the friendly relations that have existed between manufacturers for some considerable time past. The recognized leading brands are now offered at  $4\phi$  in lots of 100 tons and  $4\frac{1}{4}\phi$  @  $4\frac{3}{4}\phi$  in smaller quantities. On some of the others those figures are shaded  $\frac{1}{8}\phi$  @  $\frac{1}{4}\phi$ . Foreign stock is quoted as before, and the market seems to be fairly steady, although positively dull.

**Colors, &c.**—Dullness has been the conspicuous feature of the market for Dry and Oil Colors, ready-mixed Paints, &c. The little business effected was at irregular prices yet without deviation from the extremes that have ruled for several weeks. Nothing new has developed in the market for Block Chalk or Whiting, and on Barytes and the general line of Clays there is nothing to note except that business is slow and chiefly at the low level of prices that have ruled for some little time past.

## Oils and Turpentine.

Improvement is noted in the sales of several lines of animal and vegetable Oils, but dealings are chiefly of extreme conservative type, and it is the exception that buyers take other than moderate quantities of goods. In prices there have been comparatively few changes, but those few were chiefly in the direction of a lower level, and due to the unfavorable condition of the market for Lard and inferior Greases.

**Linseed Oil.**—City crushers and the National Company had a conference and agreed to maintain former quotations in the face of the lower cost of raw material and the continued sharp competition between outside concerns in Northern New York and New England. Business has not changed in any important particular. Purchases of small lots would appear to have increased slightly, but there is very little, if anything, doing in round lots.

**Cotton Seed Oils.**—There has been a little more pressure to sell and the weight has proven sufficient to slightly depress values, since neither export nor home trade buyers have manifested any inclination to purchase round lots, while investigations go to show that the supply in sight is larger than generally estimated. The fall in prices was to  $42\phi$  for prime Summer Yellow,  $38\phi$  @  $39\phi$  for off grade ditto,  $35\phi$  for prime crude and corresponding figures for other varieties.

**Lard Oil.**—The market has been weak and irregular owing to the depreciation in the raw material. Orders continue to be wholly for jobbing quantities, and very few at that. Dealers and manufacturers are of the opinion that this Oil will react in the near future and predict an advance in prices to rest on a parity with those that ruled throughout the earlier portions of last month. Meanwhile quotations are variable, with the extremes of  $65\phi$  @  $70\phi$  made on prime Oil.

**Menhaden Oil.**—This market has shown rather more activity during the week and sales aggregating 2000 barrels were made on the range of  $31\phi$  @  $33\phi$ , according to quantity and quality. Japan Oil is selling in a moderate way only, and the supply offering is comparatively light.

**Sperm Oil.**—The market for crude Sperm Oil has been more active. Sales involving 450 barrels for manufacture were transacted on private terms, presumed to have netted the seller about  $72\phi$ . The general quotation is  $75\phi$ . Manufactured Oils were in light request.

**Whale Oil.**—There is nothing new or interesting in the crude Whale Oil market, and holders will not make concessions to realize on their Oils. The manufactured Oils sell in a moderate way to a jobbing extent at unchanged prices.

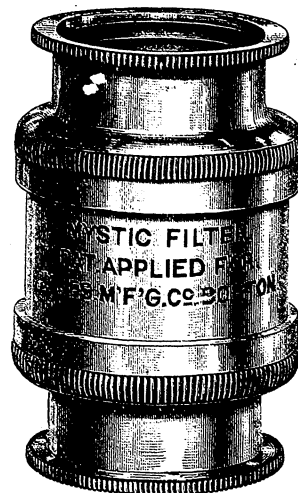
**Cocanut Oil.**—The market has ruled very quiet; only small jobbing sales are reported on the spot, and hardly any transactions in future shipments or stock afloat. Prices remain stationary.

**Olive Oil.**—There has been rather more demand for spot lots of common Oil in barrels, with sales reported at  $60\phi$  @  $62\phi$ . Future shipments of Spanish are held firm at  $62\phi$  and Italian at  $60\phi$ , with no business reported, as buy-

ers are not inclined to purchase ahead in the present unsettled condition of financial affairs.

## Mystic Water Filter.

Jones Mfg. Company, Boston, Mass., for whom Edward G. Shepard, 142 Chambers street, New York, is sales agent, are offering the Mystic water filter as here shown. It is constructed of cast brass with removable caps and woven wire strainers at each end, all of which are nickel plated. The interior

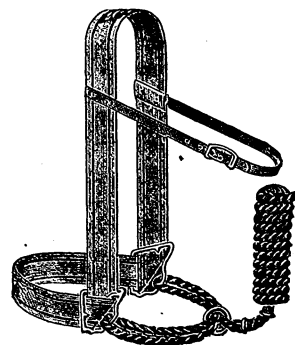


Improved Water Filter.—Full Size Cut.

is filled with bone charcoal. It has a waterway as large as the threads will allow, delivering a full, round stream of water, without splattering. Both ends are alike, so that it may be cleansed as often as desired by reversing. When necessary, it may be quickly taken apart and refilled with charcoal and put together by any one. For use on plain bibbs the company furnish a thread attachment. This filter has been designed to meet a demand for an article of this kind at a low price.

## Covert's 15-Cent Halter.

The cut herewith shown represents a halter put on the market by Covert's Saddlery Works, Farmer, N. Y. It is described as having a web of heavy striped jute in one continuous piece, with corners finished in XC, light and neat, holding the web in proper shape,



Covert's 15-Cent Halter.

and preserving the whole strength of the web by avoiding the necessity of stitching or riveting. The throat latch is referred to as being made of leather and securely fastened to the web with their improved attachments. Attention is directed to the lead and chin guard, which is of one continuous piece of rope.

### The Lynch Buckle Locks.

Lynch Mfg. Company, Madison, Wis., are introducing the lock buckle and restraint buckle locks, shown in the accompanying illustrations. Fig. 1 shows the lock in the form of a buckle, to which is attached a safety chain with a tag on the end for name. The lock is described as containing the Yale principle and is operated with a flat key. The cut shows the buckle unlocked, ready to have the chain slipped over the tongue, after which the buckle is locked by pushing the cylinder around with

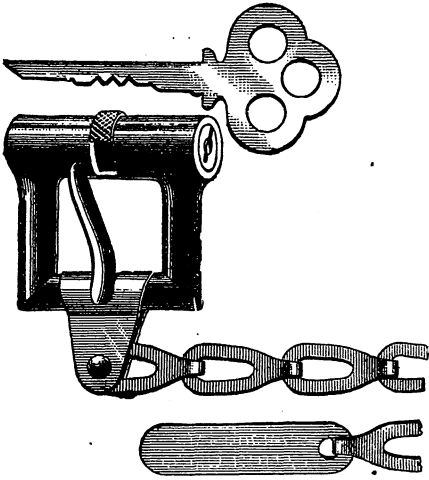


Fig. 1.—The Lynch Lock Buckle.

the finger, after the tongue has been put in place. The buckle lock may be used as a bicycle lock for locking the wheel or fastening the bicycle, as desired; also for securing grips, packages, &c., in waiting room or cars. The lock and chain are finely nickeled, and, the manufacturers state, are strong, simple and durable. The lock is also attached to straps, for various purposes, forming a buckle and lock in one. The point is made that it is always a fine buckle, and a lock the instant one wishes it. The restraint buckle, Fig. 2, is unlocked by pushing the flat key in straight, which releases the tongue. It

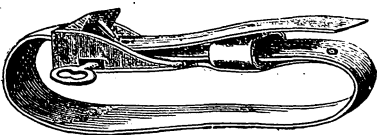


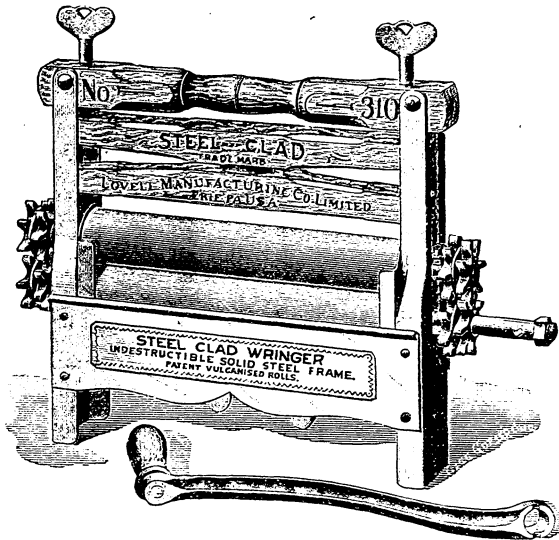
Fig. 2.—The Lynch Restraint Buckle.

is locked by slipping the bolt into position again with the finger, a spring pin preventing its locking until desired. The point is made that straps cannot be cut or broken at the buckle tongue, and that a 1-inch strap with this will stand more strain than a 3-inch one will with an ordinary buckle. The buckle is used on straps and clothing for the restraint of the insane and delirious.

### Steel-Clad Wringer.

Lovell Mfg. Company, Erie, Pa., W. H. Quinn & Co., 103 Chambers street, New York, agents, are putting the Steel-Clad Wringer on the market as shown herewith. The frame of the wringer is made of wrought steel, which, it is explained, is cut, punched and formed with dies, the parts then being riveted firmly together, and the entire frame thoroughly galvanized. To the opposite side of the wringer to that shown are attached regular-width swing

clamps and clothes guide, all of galvanized metal. The manufacturers state that by this method of construction they are enabled to retain the general form and desirable features of the wood frame wringers; to overcome their most serious defects, and to produce a wringer frame that is practically indestructible. The point is made that a stronger frame is thus produced with-



Steel-Clad Wringer.

out increased weight, one that will not rot or rust, and a wringer easily kept clean. These wringers are made in six sizes, from 10 x 1 1/4 inch rolls to 12 x 1 1/2 inch rolls.

### Improved American Waffle Iron.

The accompanying cuts represent an improved waffle iron, put on the mar-

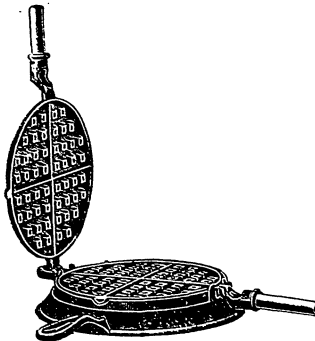


Fig. 1.—Improved American Waffle Iron.

ket by the Griswold Mfg. Company, Erie, Pa. The special features of the iron are the arrangement of the hinge,

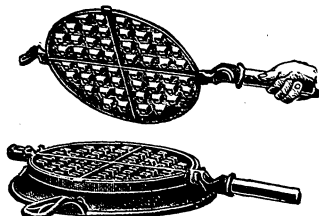


Fig. 2.—Waffle Iron Taken Apart.

which permits the iron being taken apart for cleaning, as in Fig. 2, and the long wooden handles, so made as to avoid the burning of the hands. The iron is simple in construction and is adapted for use on gas or gasoline stoves.

### Gas Lighter and Puzzle Lock.

Magic Introduction Company, 321 Broadway, New York, are introducing the above goods, as illustrated herewith. As shown in Fig. 1, the gas lighter is attached to a burner by means of clamps, which are sprung around the burner near the top. A roll of tape having a series of igniting pellets at intervals

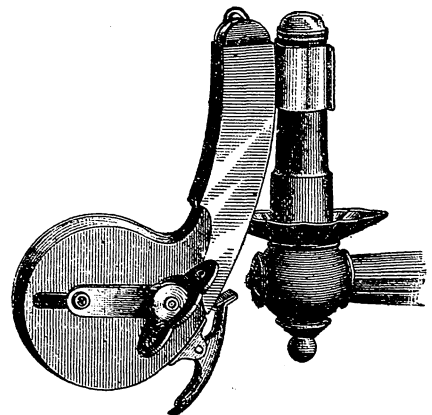


Fig. 1.—The Magic Gas Lighter.

attached to the axle of a turn key. When the key is turned the tape is moved, bringing a pellet in contact

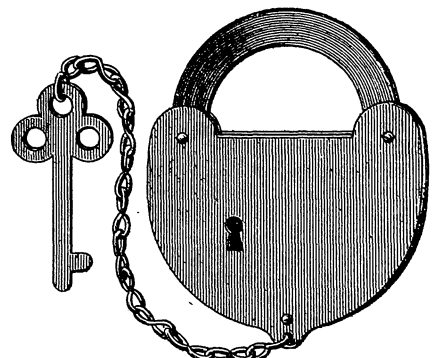


Fig. 2.—Magic Columbian Puzzle Lock.

with a steel point at the top of the burner, producing a flash of light. The light thus produced ignites the gas, it having been turned on before the key

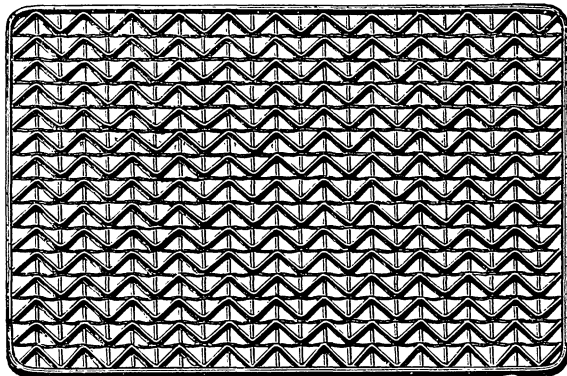
was turned. When the pellets on the tape are exhausted another tape may be introduced into the lighter.

The point is made by the manufacturers that the lighting is done without the use of matches or electricity, and with no danger of burning carpets with match ends; also, that the gas may be turned off when leaving the room and instantly lighted when returning. The lighter is recommended particularly for bedrooms, dark halls and bathrooms. The entire length of the lighter is less than 3 inches, and the goods are neatly finished in nickel plate.

The Puzzle lock, Fig. 2, corresponds in size to that of the cut. It is made of sheet metal and is open at the top. To open the lock a 1-cent piece is put in the opening and the key turned, the cent taking the place of a tumbler in releasing the shackle. The manufacturers remark that the article, aside from being a practical padlock, is a most interesting and amusing puzzle.

### Horrocks' Metal Mat.

Joshua Horrocks, 45 Cliff street, New York, is manufacturing the metal mat here illustrated. The steel wires are of No. 13 gauge and so bent as to



Metal Mat.

form a resting place for the metal strips which are slipped on to the longitudinal wires alternately with similar wires running across the mat. The steel strips are  $\frac{1}{2}$  inch wide and of No. 18 gauge. Holes are punched at the angles so they can be pushed through the wires. When the article is of the size desired the whole fabric is surrounded with a grooved steel border  $\frac{1}{2}$  inch wide, with sides  $\frac{1}{4}$  inch deep, insuring a neat finish. The border is fastened rigidly to the mat at intervals of 10 inches by means of metal strips of the same width and gauge, the ends lapping on the inside. The galvanizing is the last process of manufacture and is equivalent to soldering every joint. There are no rivets; it is reversible and, the manufacturer says, it will not break. Eight regular sizes are made and others can be supplied to order. This mat is patented in England and Canada.

### The Security Dust Pan.

The National Handy Article Company, Louis and Campan streets, Grand Rapids, Mich., are manufacturing a new dust pan, which is herewith illustrated, Fig. 1 showing it ready for use. It has a long handle, enabling the user to sweep up all dust while standing. It is so constructed that a slight pres-

sure on the handle will make a close contact on the floor, and the bail is so attached that when raising the handle the pan tips up in front, the sweepings



Fig. 1.—Security Dust Pan.

dropping down into the inclosed back, securing the dust from spilling or blowing away. It is described as obviating

the necessity of stooping or kneeling and exerting heavy pressure to keep the pan tight to the floor, while trying

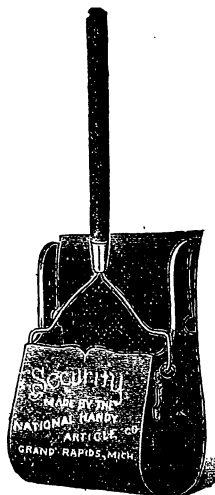


Fig. 2.—In Position to Carry.

to use the broom with the other hand, in an awkward and ineffectual manner. The point is made that the pan not only saves stooping, but provides for carrying the sweepings away without spilling them.

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# Current Hardware Prices.

AUGUST 9, 1893.

Note.—The quotations given below represent the Current Hardware Prices which prevail in the market at large. They are not given as manufacturers' prices, and manufacturers should not be held responsible for them. In cases where goods are quoted at lower figures than the manufacturers name, it is not stated that the manufacturers are selling at the prices quoted, but simply that the goods are being sold, perhaps by the manufacturers, perhaps by the jobbers at the figures named.

The character @ is used to indicate a range, of price; thus discount 50&10@50&10&5 % signifies that the goods in question are sold at prices ranging from 10 discount 50 and 10 % to discount 50 and 10 and 5 %.

## Adjusters, Blind—

Domestic..... doz \$3.00, 32%  
Excelsior..... doz \$10.00, 50&10&5  
North's..... doz net @ 10%  
Zimmerman's—See Fasteners Blind.

## Ammunition—See Caps, Cartridges, Shells, &c.

## Anvils—

Bagle Anvils, 1/2 to 9/16..... 15&15&5  
Peter Wright's..... 11&11%  
Armstrong's House Sole..... 10%  
Am. Wrought, Horseshoe brand, 11&11%  
Trenton..... 10%  
Wilkinson's..... 10%  
Moore & James Mfg. Co..... 33%  
List Jan. 9, 1893, 40&40&10%  
List Jan. 9, 1893, 40&40&10%

## Anvil Vise and Drill—

Millers Falls Co., \$18.00..... 20%  
Cheney Anvil and Vise..... 25%  
Allen Anvil and Vise \$3.00..... 40&10%  
Star..... 45&5%

## Apple Parers—See Parers, Apple, &c.

## Augers and Bits—

Common Augers and Bits..... 70&70&10%  
Boring Machine Augers..... 70&70&10%  
Car Bits, 12-in. twist..... 50%  
Russell Jennings' Augers and Bits 25&10%  
Jennings' Pattern Car Bits..... 40%  
Jennings' Pattern Auger Bits..... 60%  
Snell's Bits..... 60&5%  
C. E. Jennings & Co., No. 10, extension tip..... 40%  
C. E. Jennings & Co., No. 30..... 60%  
C. E. Jennings & Co., Auger Bits, 1/2 set, 3/4 quarters, No. 5, \$5; No. 30, \$3.50, 25%  
Lewis' Patent Single twist..... 45%  
Pugh's Black..... 20%  
Pugh's Jennings Pattern..... 30%  
L'Hommedieu Car Bits..... 15&10%  
Forster Pat. Auger Bits..... 15%  
Cincinnati Bell-Hangers' Bits..... 30&10

## Bit Stock Drills—

Morse Twist Drills..... 50&10&5%  
Standard..... 50&10&5%  
Cleveland..... 50&10&5%  
Syracuse, for metal..... 50&10%  
Syracuse, for wood (wood list) 30&30&5%  
Cincinnati, for wood..... 30&10%  
Cincinnati, for metal..... 45&10%

## Expansive Bits—

Clark's small, \$18; large, \$26, 35&35&10%  
Ives' No. 4, doz. \$60..... 40%  
Svan's..... 40%  
Steers' No. 1, \$26; No. 2, \$18..... 35&40%  
Stearns' No. 2, \$48..... 20%

## Gimlet Bits—

Common..... doz gross \$2.75&3.25  
Diamond..... doz \$1.25..... 40&10%  
See..... 20%  
Double Cut, Shepardson's..... 25&25&5%  
Double Cut, Ct. Valley Mfg. Co..... 30&10%  
Double Cut, Hartwell's..... 30%  
Double Cut, Douglass..... 40&10%  
Double Cut, Ives..... 60&60&10%

## Hollow Augers—

Ives'..... 33%  
French, Swift & Co. (Becker)..... 33%  
Douglass..... 20%  
Bonney's Adjustable, doz \$48..... 50%  
Stearns'..... 20&10%  
Ives' Expansive, each \$4.50..... 50&5%  
Universal Expansive, each \$4.50..... 20%  
Wood's..... 25&10%  
Cincinnati Adjustable..... 25&10%  
Cincinnati Standard..... 25&10%

## Ship Augers and Bits—

L'Hommedieu's..... 15&10&15&10&5%  
Watrous'..... 25&25&10%  
Snell's..... 25&25&10%  
Snell's Ship Auger Pat'n Car Bits..... 15&10&15&10&5%

## Awl Hafts—See Hafts, Awl.

## Awls—

Awls, Sewing, Common..... gr. 85&90%  
Awls, Should, Peg..... gr. \$1.50&\$1.55  
Awls, Pat. Peg..... gr. 35&35%  
Awls, Shouldered Brad..... gr. \$1.30&\$1.40  
Awls, Handled Brad..... gr. \$2.60&\$3.00  
Awls, Handled Scratch..... gr. \$4.00&\$4.50  
Awls, Socket Scratch..... doz. \$1.10&\$1.20

## Awl and Tool Sets—See Sets, Awl and Tool.

## Axes—

Plain..... Beveled.....  
First quality, best brands \$7.00..... \$7.50  
First qual., other brands..... 6.50  
Second quality..... 5.50

## Axle Grease—See Grease, Axle.

## Axles—

No. 1..... 3%  
No. 7 to 14..... 60&10%  
No. 15 to 18..... 47%  
No. 19 to 22..... 70%  
Concord Axles, loose collar..... 4%  
Concord Axles, solid collar..... 5%  
Watrous Tubular Self Oiling..... 33%  
List Jan. 9, 1893, 40&40&10%  
List Jan. 9, 1893, 40&40&10%

## Bag Holders—See Holders, Bag.

## Balances—

Spring Balances..... 40%  
Chatillon, No. 200..... 30%  
Chatillon, doz., \$0.80 0.95 1.75 net  
Chatillon Straight Balances..... 40%  
Chatillon Circular Balances..... 50&10%

## Barb Wire—See Wire, Barb.

## Bars—

Crow.....  
Cast Steel..... doz \$3%  
Iron, Steel Points..... doz \$3%

## Basins, Wash—

Standard Fiberware, No. 1, 10 1/2-in., \$1.30;  
12-inch, \$2.00; 13 1/2-inch, \$2.50; 15-inch, \$3.00.

## Beams, Scale—

Scale Beams, List Jan. 12, '82, 50&10%  
Chatillon's No. 1..... 40%  
Chatillon's No. 2..... 50%  
Custer's..... 33%

## Beaters—

Egg—  
Dover..... doz \$1.00&\$1.20  
Duplex (Standard Co.)..... doz \$1.00  
Dover (Standard Co.)..... doz \$1.00  
Duplex Extra Heavy (Standard Co.)..... doz \$3.50  
Bryant's..... doz \$3.50  
Double (H. & R. Mfg. Co.), gro., No. 0 \$12.00; No. 1, \$15.00; No. 2, \$26.00  
Easy (H. & R. Mfg. Co.)..... gro \$12.00  
Triple (H. & R. Mfg. Co.)..... gro \$16.50  
Spiral..... gro \$4.25&\$4.50  
Improved Acme (H. & R. Mfg. Co.)..... gro \$9.00  
Silver & Co..... doz \$5.50

## Culinary—

Keystone, P. D. & Co., Each, No. 1, \$1;  
No. 2, \$2..... 20%

## Bells—

Cow—  
Common Wrought..... 60&10%  
Western, Sargent's list..... 70&10%  
Kentucky, "Star"..... 20&10%  
Kentucky, Sargent's list..... 70&10%  
Kentucky Durham..... 70&10%  
Dodge, Genuine Kentucky..... 70&70&10%  
Texas Star..... 50&10&50&10&5%

## Door—

Gong, Abbe's..... 33%  
Gong, Yankee..... 45&10%  
Gong, Barton's..... 40&10&50%  
Crane, Brooks'..... 50&10&2%  
Crane, Cone's..... 10%  
Crane, Cone's..... 20&10%  
Lever, Sargent's..... 60&10%  
Lever, Taylor's Bronzed or Plated..... net  
Lever, Taylor's Japanned..... 25&10%  
Lever, R. & E. Mfg. Co.'s..... 50&10&2%  
Pull, Brooks'..... 50&10&2%

## Electric—

Wollensak's..... 20%  
Bigelow & Dowse..... 20%

## Hand—

Light Brass..... 70&10&70&10&5%  
Extra Heavy..... 70%  
White..... 70%  
Silver Chrome..... 33%  
Globe Cone's Patent..... 25&10&35%

## Miscellaneous—

Call..... 45&50%  
Farm Bells..... 25&35%  
Steel Alloy Church and School Bells..... 40%

## Bellows—

Blacksmiths'..... 60&10&5&60&10&10%  
Molders'..... 40&10&50%  
Hand Bellows..... 40&10&50%

## Belting, Rubber—

Common Standard..... 75&75&10%  
Standard..... 70&70&10%  
Extra..... 60&10&80&10&10%  
N.Y.B. & P. Co., Carbon..... 60&60&5%  
N.Y.B. & P. Co., Diamond..... 50&50&5%  
N.Y.B. & P. Co., Para..... 40&40&5%

## Bench Stops—See Stops, Bench

## Benders and Upsetters, Tire

Stoddard's Lightning Tire Upsetters..... 15%  
Detroit Perfected Tire Bender..... 15%  
Green River Tire Benders and Upsetters..... 20%

## Bits—

Auger, Gimlet, Bit Stock Drills, &c., see Augers and Bits.

## Bit Holders—See Holders.

## Blind Adjusters—See Adjusters, Blind.

## Blind Fasteners—See Fasteners, Blind.

## Blind Staples—See Staples, Blind.

## Blocks—

Cleveland Block Co., Mal. Iron 6 1/2 6 1/2 10%  
Moore's Novelty, Mal. Iron..... 5%  
Sure Grip Steel Tackle Blocks..... 25%  
See also Machines, Hoisting.

## Bolts—

## Carriage, Machine, &c.—

Com. list June 10, '84..... 75&10&5&80%  
Genuine Eagle, Norway, list Oct. '84..... 80%  
Eagle, Norway, list Oct. '84..... 80%  
Phila. pattern, list Oct. 7, '84..... 80%  
R.B. & W., old list..... 70%  
Machine, list Jan. 1, 1890..... 80&10%  
Bolt Ends, list Jan. 1, 1890..... 80&10%

## Door and Shutter—

Cast Iron Barrel, Square, &c..... 70&10%  
Cast Iron Shutter Bolts..... 70&10%  
Cast Iron Chain (Sargent's list)..... 65&10%  
Ives' Patent Door Bolts..... 60&10&60&10&5%  
Wrought Barrel..... 70&10&75%  
Wrought Square..... 70&10&75%  
Wrt Shutter, all Iron, Stanley's..... 60&10&60&10&10%  
Wrt Shutter, Brass Knob..... 50&50&6%  
Wrt Shutter, Sargent's list..... 60&10%  
Wrt Sunk Flush, Sargent's list..... 60&10%  
Wrt Sunk Flush, Stanley's list..... 60&10&5%  
Wrt B. K. Flush, Common..... 55&10%

## Stove and Plow—

Stove..... 60&10&60&10&5%  
Plow..... 60&10&50&60&10&10%  
R. B. & W., Plow..... 55%

## Tire—

Common, list Feb. 28, '83..... 65&65&5%  
Port Chester Bolt and Nut Company:  
Empire list Feb. 28, '83..... 65%  
Eystone, Philadel., list Oct. '84..... 80%  
Norway Phila., list Oct. '84..... 75%  
American Screw Company:  
Norway Phila., list Oct. 16, '84..... 75%  
Eagle, Phila., list Oct. 16, '84..... 80%  
Philadel., list Oct. 16, '84..... 80%  
Bay State, list Feb. 28, '83..... 65%  
R. B. & W., Philadel., list Oct. 16, '84..... 80%

## Borers, Tap—

Common and Ring..... 20&10%  
Ives' Tap Borers..... 33%  
Enterprise Mfg. Co..... 33%  
Clark's..... 33%  
Borax—  
Per doz..... 9%  
Boring Machines—See Ma-

## Boxes, Wagon—

Per doz..... 2%  
Boxes, Miter.  
Spiker's Excelsior, 3 in. \$7.50, 4 in \$8.50, 5 in \$13.44, 6 in \$15.00..... 20%

## Braces—

American Bit Brace and Tool Co.  
Nos. 10, 12, 20..... 60&10%  
Nos. 11, 21, 24, 27..... 70&70&10%  
Nos. 22, 23, 25..... 60&10&5%  
Nos. 13, 26, 36, 37..... 70&10&5%  
Amidon's  
Barker's Imp'd Plain..... 75&10&80%  
Barker's Imp. Nickeled..... 65&10&70%  
Eliet..... 75&10&80%  
Eclipse Ratchet..... 60%  
Globe Jawed..... 40&40&10%  
Corner Brace..... 40&40&10%  
Universal, 8 in. \$2.10; 10 in. \$2.25  
Buffalo Ball..... \$1.10&\$1.15  
Barber's..... 50&10%  
Saxton's  
Regular, plain..... 65&70%  
Sargent's list..... 60&10&70&10%  
Shelf, fancy  
Sargent's list..... 70&70&10%  
Other makes at a wide range of prices.  
Bradley Shelf Brackets..... 70&10%

## Bright Wire Goods—See Wire.

## Broilers—

Hen's Self-Inch..... 9 10 9x11  
Basting..... Per doz. \$4.50 5.50 6.50  
New Haven..... 50%  
We Co., list..... 65&10%  
Morgan Odorless..... doz. \$12.50  
Queen City..... 33%  
Brackets—  
Shell, plain, list..... 65&70%  
Sargent's list..... 60&10&70&10%  
Shelf, fancy  
Sargent's list..... 70&70&10%  
Other makes at a wide range of prices.  
Bradley Shelf Brackets..... 70&10%

## Buckets, Well—

Galvanized—  
Hill's..... doz. 12 qt. \$4.25; 14 qt. \$5.25  
Iron Clad..... doz. 14 qt. \$4.25&\$4.50  
Helwig's Flat Iron Band..... \$3.75  
Helwig's Wired Top..... doz \$4.00  
Bull Rings—See Rings, Bull.  
Butcher's Cleavers—See Cleavers, Butcher's.  
Brass—  
Wrought Brass..... 80&80&10%  
Cast Brass, Tiebout's..... 50%

## Cast Brass, Fast..... 33% Cast Brass, Loose Joint..... 33% Cast Iron—

Fast Joint, Narrow..... 50&10&5&60%  
Fast Joint, Broad..... 50&10&60%  
Loose Joint..... 50&10&60%  
Loose Joint, Japanned..... 75&75%  
Loose Joint, Jap. with Acorns..... 80%  
Parliament Butts..... 75&75%  
Mayer's Hinges..... 80%  
Loose Pin, Acorns..... 80%  
Loose Pin, Acorns, Japanned..... 80%  
Loose Pin, Acorns, Japanned, Plated Tips..... 80%  
Wrought Steel—  
Fast Joint, Narrow..... 50&10&5&60%  
Fast Joint, Lt. Narrow..... 50&10&60%  
Fast Joint, Broad..... 50&10&60%  
Loose Joint, Broad..... 50&10&60%  
Table Butts, Back Flaps, &c..... 50&50&10%  
Inside Blind, Regular..... 50&50&10%  
Inside Blind, Light..... 50&50&10%  
Loose Pin..... 50&50&10%  
Bronzed Wrought Butts..... 50&50&10%

## Callipers—See Compasses.

## Calks, Toe—

Gautier, One Prong, Blunt..... 5%  
Burke's One Prong, Blunt..... 5%  
Burke's Two Prong, Blunt..... 5%  
Burke's One Prong, Sharp..... 5%

## Can Openers—See Openers, Can.

## Cans, Milk—

S. S. & Co.: 5-gal., \$3.00; 8-gal., \$4.40;  
10-gal., \$4.75 each..... 40&10%  
Cans, Oil—  
Galvanized Blue Band, 5 gal., Tip-Top, 1/2 doz., \$12.00  
Galvanized Blue Band, 5 gal., Faucet, 1/2 doz., \$8.00  
Galvanized Blue Band, 1 gal., 1/2 doz., \$2.25  
Glass Oil, Friend..... doz. \$2.75

## Caps—

Percussion—  
Hicks & Goldman's and Union Metallic Cartridge Co. \$1.00  
F. L. Waterproof, 1-10's..... 35%  
E. B. Trimmer Edge, 1-10's..... 47%  
E. B. Grand Edge, Cent. Fire, 1-10's..... 47%  
Musket, Waterproof, 1-10's..... 47%  
G. D..... 50%  
S. B. Genuine Imported..... 27%  
Eley's E. B..... 60%  
Eley's D Waterproof, Central Fire..... 1.00

## Carders—

Watson's Cotton, Wool Horse and File, list January 28, 1891..... 25%

## Carpet Stretchers—

See Stretchers, Carpet.

## Cartridges—

Rim Fire Cartridges..... 60&5&3%  
Rim Fire Military..... 15&3%  
Cent. Fire, Pistol and Rifle..... 25&5&3%  
Cent. Fire, Military and Sporting..... 15&5&3%  
Blank Cartridges, except 22 and 32 cal., additional 10% to above discounts..... 5%  
Blank Cartridges, 22 cal., \$1.75..... 5%  
Blank Cartridges, 32 cal., \$3.60..... 5%  
Primed Shells and Bullets..... 15&5&3%  
B. B. Caps, Round Ball, \$1.75..... 5%  
B. B. Caps, Con. Ball, Swgd., \$2.00..... 5%

## Carpet Sweepers—

See Sweepers, Carpet.

## Casters—

Bed..... Brass..... 55&55&10%  
Plate..... Others..... 60&60&10%  
Shallow Socket..... 40&10%  
Deep Socket..... 40&10%  
Martin's Patent (Phoenix) 45&10&50&10%  
Fucker's Patent, low list..... 45%  
Payson's Anti-friction..... 70&70&10%  
Payson's Truck..... 60&60&10%  
Yale Casters, low list..... 45%  
Yale, Gem..... 70%  
Giant Truck Casters..... 65%  
Stationary Truck Casters..... 50&10%  
Socket Truck Casters..... 60&50&10%  
Gwinner's Common Sense..... 45%  
Gwinner's Hercules..... 45%

## Cattle Leaders—

See Leaders, Cattle.

## Cement—

Victor Elastic..... 5 1/2 pails \$5.40

## Chain—

Trace, Wagon and Fancy Chains, list revised May, 1893..... 60&60&10%  
American Coil, in cask lots, 3-16 4-16 5-16 6-16 7-16 8-16 9-16 10-16 11-16 12-16 13-16 14-16 15-16 16-16 17-16 18-16 19-16 20-16 21-16 22-16 23-16 24-16 25-16 26-16 27-16 28-16 29-16 30-16 31-16 32-16 33-16 34-16 35-16 36-16 37-16 38-16 39-16 40-16 41-16 42-16 43-16 44-16 45-16 46-16 47-16 48-16 49-16 50-16 51-16 52-16 53-16 54-16 55-16 56-16 57-16 58-16 59-16 60-16 61-16 62-16 63-16 64-16 65-16 66-16 67-16 68-16 69-16 70-16 71-16 72-16 73-16 74-16 75-16 76-16 77-16 78-16 79-16 80-16 81-16 82-16 83-16 84-16 85-16 86-16 87-16 88-16 89-16 90-16 91-16 92-16 93-16 94-16 95-16 96-16 97-16 98-16 99-16 100-16 101-16 102-16 103-16 104-16 105-16 106-16 107-16 108-16 109-16 110-16 111-16 112-16 113-16 114-16 115-16 116-16 117-16 118-16 119-16 120-16 121-16 122-16 123-16 124-16 125-16 126-16 127-16 128-16 129-16 130-16 131-16 132-16 133-16 134-16 135-16 136-16 137-16 138-16 139-16 140-16 141-16 142-16 143-16 144-16 145-16 146-16 147-16 148-16 149-16 150-16 151-16 152-16 153-16 154-16 155-16 156-16 157-16 158-16 159-16 160-16 161-16 162-16 163-16 164-16 165-16 166-16 167-16 168-16 169-16 170-16 171-16 172-16 173-16 174-16 175-16 176-16 177-16 178-16 179-16 180-16 181-16 182-16 183-16 184-16 185-16 186-16 187-16 188-16 189-16 190-16 191-16 192-16 193-16 194-16 195-16 196-16 197-16 198-16 199-16 200-16 201-16 202-16 203-16 204-16 205-16 206-16 207-16 208-16 209-16 210-16 211-16 212-16 213-16 214-16 215-16 21







**Halters—**

Covert's Rope, Jute..... 60&10&10&25  
Covert's Rope, 7-18 in. Jute..... 70&25  
Covert's Rope, 1/2 in. Hemp..... 50&25  
Covert's Adj. Rope Halters..... 40&25  
Covert's Hemp Horse and Cattle Tie..... 50&10&25

Covert's Jute Horse Ties..... 70&25  
Covert's Jute Cattle Ties..... 70&10&25  
Covert's Adj. Web Halters..... 35&25  
Covert's Saddlery Works Horse and Cattle Tie..... 38&45  
Covert's Saddlery Works Handy Web Halters..... 33&45

**Hammers—**

**Handled Hammers—**  
Maydole's, list Dec. 1, '85..... 25&10&35  
Buffalo Hammer Co..... 50&10  
Humason & Beckley..... 50&10  
Atha Tool Co..... 50&10  
Verree..... 40&10  
C. Hammond & Son..... 40&10  
Fayette R. Plumb..... 40&10  
Artisan's Choice, A. E. Nail..... 40&10  
Regular Y. & P. A. E. Nail..... 50  
Horsehoe Turning Hammers..... 50  
Other Hammers..... 50&10  
Cheney's Claw..... 40&10  
Cheney's Machinist's & Riveting..... 50&25  
Magnetic Tack, Nos. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100..... 100  
Nelson Tool Works..... 40&10  
Warner & Nobles, new list..... 25&10  
Peck, Stow & Wilcox..... 35&40  
Sargent's..... 40&10

**Heavy Hammers and Sledges—**

3 lb and under..... 40  
5 lb..... 75&10&75&10  
10 lb..... 85  
Over 5 lb..... 80  
Wilkinson's Smiths..... 10&11

**Handcuffs and Leg Irons—**

See Police Goods.

**Handles—**

**Cross-Cut Saw Handles—**  
Adkins, new list..... 40  
Champion..... 15  
Wiley's Perfection..... 40  
Sensible..... 40

**Iron, Wrought or Cast—**

Door or Thumb..... 1 2 3 4  
Nos..... 1 2 3 4  
Per doz..... \$0.90 1.00 1.08 1.85 1.50

Rogin's Latches..... 40&10&10  
Bronze Iron Drop Latches..... 40  
Jap'd Store Door Handles—Nuts, \$1.02;  
Plate, \$1.10; no plate, \$0.88..... net  
Barn Door, 4 doz \$1.40..... 10&10  
Orest and Lifting..... 70&70&10

**Wood—**

Saw and Plane..... 40&10&50  
Hammer, Hatchet, Axe, &c..... 40&40&50  
Brad Axl..... 40  
Hickory Firmer Chisel, ass'd..... 40  
Hickory Firmer Chisel, large..... 40  
Apple Firmer Chisel, ass'd..... 40  
Apple Firmer Chisel, large..... 40  
Socket Firmer Chisel, ass'd..... 40  
Socket Framing Chisel, ass'd..... 40  
J. B. Smith & Co.'s Pat File..... 50  
File, assorted..... 40  
Auger, assorted..... 40  
Auger, large..... 40  
Pat. Auger, Ives..... 30&10  
Pat. Auger, Douglass..... 30  
Pat. Auger, Swan's..... 30  
Hoe, Rake, Shovel, &c..... 50&50&10

**Hangers—**

Barn Door, old patterns..... 70&70&55  
Barn Door, New England..... 70&70&55  
Samson Steel Anti-Friction..... 55  
Cleans Steel..... 55  
Hamilton Wrought Steel Track..... 55  
Champion..... 60&10  
Olinx Anti-Friction..... 55  
Zenith for Wood Track..... 55  
Sterling..... 55  
Victor, No. 1, \$15.00; No. 2, \$18.50..... 55  
Kluder's..... 50  
Boss..... 50  
Best Anti-Friction..... 50  
Duplex (Wood Track)..... 50  
Terry's Modern..... 50  
Terry's Ideal..... 50  
Terry's Solid..... 50  
Terry's Shield..... 50  
Terry's Wrought Single Strap..... 50  
Cronk's Patent Steel Covered..... 50  
Carrier Steel Anti-Friction..... 50  
Richards..... 50  
Lane's New Standard..... 50  
Lane's Standard..... 50  
Lane's Parlor..... 40  
Warner's Pat..... 20  
Stearns' Anti-Friction..... 20  
Stearns' Challenge..... 25  
Cincinnati Nos. 1, \$2.25; 2, \$2.50; 4, \$2.60..... 20  
Paragon, Nos. 5, 6, 7 and 8..... 20  
Crescent..... 60  
Nickel, Steel, Nos. 0, 25; 1, 30; 2, 45..... 40  
Chicago Anti-Friction..... 40  
Star..... 40  
Barry..... 50  
Interstate..... 50  
Pendulum, Payson's..... 40  
Woody..... 45  
Economy, \$6.00..... 50  
Perfection..... 50  
Lundy, Steel Parlor..... 50  
Matchless..... 50  
Magic..... 45  
Wild West..... 45  
Moore's Elevator..... 33  
Moore's Baggage Car Door..... 33  
Moore's Railroad..... 55

**Harness Snaps—See Snaps.****Hatchets—**

American Axe and Tool Co..... 40 & 10  
Blood's..... 50  
Hunt's..... 50  
Hurd's..... 50  
Mann's..... 50  
Peck's..... 50  
Underhill's..... 50  
Buffalo Hammer Co..... 50  
Fayette R. Plumb..... 50  
C. Hammond & Son..... 50  
Sargent's & Co..... 50  
F. S. & W. Co..... 50  
Toll York Edge Tool Co..... 100  
Schulte, Lohoff & Co..... 50

**Hay and Straw Knives—**

See Knives.

**Hinges—****Blind Hinges—**

Barker..... 75&25  
Huffer..... 50  
Clark's, Nos. 8, 5, 40 and 50..... 30  
Clark's, Morse Gravity..... 50  
Meynard's, Nos. 1, 3, 5, 11, 12, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45, 47, 49, 51, 53, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117, 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177, 179, 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327, 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387, 389, 391, 393, 395, 397, 399, 401, 403, 405, 407, 409, 411, 413, 415, 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817, 819, 821, 823, 825, 827, 829, 831, 833, 835, 837, 839, 841, 843, 845, 847, 849, 851, 853, 855, 857, 859, 861, 863, 865, 867, 869, 871, 873, 875, 877, 879, 881, 883, 885, 887, 889, 891, 893, 895, 897, 899, 901, 903, 905, 907, 909, 911, 913, 915, 917, 919, 921, 923, 925, 927, 929, 931, 933, 935, 937, 939, 941, 943, 945, 947, 949, 951, 953, 955, 957, 959, 961, 963, 965, 967, 969, 971, 973, 975, 977, 979, 981, 983, 985, 987, 989, 991, 993, 995, 997, 999, 1001, 1003, 1005, 1007, 1009, 1011, 1013, 1015, 1017, 1019, 1021, 1023, 1025, 1027, 1029, 1031, 1033, 1035, 1037, 1039, 1041, 1043, 1045, 1047, 1049, 1051, 1053, 1055, 1057, 1059, 1061, 1063, 1065, 1067, 1069, 1071, 1073, 1075, 1077, 1079, 1081, 1083, 1085, 1087, 1089, 1091, 1093, 1095, 1097, 1099, 1101, 1103, 1105, 1107, 1109, 1111, 1113, 1115, 1117, 1119, 1121, 1123, 1125, 1127, 1129, 1131, 1133, 1135, 1137, 1139, 1141, 1143, 1145, 1147, 1149, 1151, 1153, 1155, 1157, 1159, 1161, 1163, 1165, 1167, 1169, 1171, 1173, 1175, 1177, 1179, 1181, 1183, 1185, 1187, 1189, 1191, 1193, 1195, 1197, 1199, 1201, 1203, 1205, 1207, 1209, 1211, 1213, 1215, 1217, 1219, 1221, 1223, 1225, 1227, 1229, 1231, 1233, 1235, 1237, 1239, 1241, 1243, 1245, 1247, 1249, 1251, 1253, 1255, 1257, 1259, 1261, 1263, 1265, 1267, 1269, 1271, 1273, 1275, 1277, 1279, 1281, 1283, 1285, 1287, 1289, 1291, 1293, 1295, 1297, 1299, 1301, 1303, 1305, 1307, 1309, 1311, 1313, 1315, 1317, 1319, 1321, 1323, 1325, 1327, 1329, 1331, 1333, 1335, 1337, 1339, 1341, 1343, 1345, 1347, 1349, 1351, 1353, 1355, 1357, 1359, 1361, 1363, 1365, 1367, 1369, 1371, 1373, 1375, 1377, 1379, 1381, 1383, 1385, 1387, 1389, 1391, 1393, 1395, 1397, 1399, 1401, 1403, 1405, 1407, 1409, 1411, 1413, 1415, 1417, 1419, 1421, 1423, 1425, 1427, 1429, 1431, 1433, 1435, 1437, 1439, 1441, 1443, 1445, 1447, 1449, 1451, 1453, 1455, 1457, 1459, 1461, 1463, 1465, 1467, 1469, 1471, 1473, 1475, 1477, 1479, 1481, 1483, 1485, 1487, 1489, 1491, 1493, 1495, 1497, 1499, 1501, 1503, 1505, 1507, 1509, 1511, 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<b>Britten, Graham &amp; Mathes, list Jan. 1890.</b>	
Plate	60&10&10%
Barnes Mfg. Co.	40&40&10%
Fale	net prices
Delta Flat Key	30%
Bomer's Night Watches	50&10%
Brooklyn Latches	50&10%
Wagner's Burglar Proof	50%
<b>Elevator—</b>	
Moore's	33%
<b>'Padlocks—</b>	
List June 10, 1891.	50&2%
Norwich Lock Mfg. Co., old list.	50&2%
Yale Lock Mfg. Co.	net prices
Eagle	40%
Bureka, Eagle Lock Co.	40&2%
Bomer's Nos. 0 to above No. 100	30%
Romer's Scandinavian, No. 100 to 508	15%
A. E. Deltz	40%
Champion Padlocks	40%
Hotchkiss	30%
Star	80%
Horseshoe	40&40&10%
Barnes Mfg. Co.	50&50&10%
Rock's	30%
Scandinavian	90&40%
M. T. Fraim's Keystone Scandinavian	90&10%
Nos. 119, 120, 130 and 140	90&10%
Other Nos.	85%
Ames Sword Co. up to No. 150	40%
Ames Sword Co. No. 150	50%
Slamaker, Barry & Co.	50%
No. 1010 line	90&5%
No. 41 line	50%
No. 61 line	60%
No. 21 line	80%
<b>Sash, &amp;c.—</b>	
Clark's No. 1, 10; No. 2, 3	33%
Ferguson's	33%
Victor	60&10&2%
Walker's	10%
Attwell Mfg. Co.	25&33%
Reading	60&10&60&10&10%
Hammond's Window Springs	40%
Common Sense, Jap'd, Cop'd and Brzd.	gr \$4.00
Common Sense, Nickel Plated.	gr \$10.00
Universal	30%
Kempshall's Gravity	60%
Kempshall's Model	60&60&10%
Corbin's Daisy, list Feb. 15, 1886	70%
Payson's Perfect	60&10&10%
Huginlin's Sash Balances	25&25&2%
Huginlin's New Sash Locks	25&25&2%
Ives Patent	60&10&5&60&10&10%
Fish (Liesche's Pat.), No. 100	gr, 50%
No. 105, gr, 10	50%
Davis, Bronze, Barnes Mfg. Co.	60%
Champion Safety list January, 1893	70&5%
Security	70%
Giant, list Jan., 1892	70&5%
Wolcott's	60&10&2%
Monarch	50%
<b>Lumber Tools—</b>	
<b>Saw Tools, Lumber.</b>	
Four-ounce bottles	gr doz, \$1.75; gr gross, \$17.00
<b>Machines.</b>	
<b>Boring—</b>	
Without Augers. Upright. Angular.	
Douglas	5.50 \$8.75
Snells, Rice's Pat.	5.50 6.75 40&10&10%
Jennings	5.50 6.75 45&45&10%
Other Machines	2.35 2.75
Phillips' Patent	7.00 7.50
With Auger	7.50
Miller's Fall	7.50
Boss, Carpenters' 3.85	
Boss, Ship Bldrs' 3.85	
<b>Fluting—</b>	
Knox, 4 1/2-inch Rolls	\$3.25 each
Knox, 6-inch Rolls	\$3.60 each
Eagle, 3 1/2-inch Rolls	\$2.15
Eagle, 5 1/2-inch Rolls	\$2.85
Crown, 4 1/2 in., \$3.50; 6 in., \$4.00; 8 in., \$4.50 each	
Crown Jewel, 6 in.	\$3.50 each
American, 5 in., \$3.00; 6 in., \$3.40; 7 in., \$4.50 each	
Domestic Fluter	each, \$1.50
Geneva Hand Fluter, White Metal	doz \$12, 25%
Crown Hand Fluter, Nos. 1, \$15.00; 2, \$12.50; 3, \$10.00; 4, \$8.25	
Shepard Hand Fluter, No. 85, per doz	\$15.50
Shepard Hand Fluter, No. 110, doz	\$11.00
Shepard Hand Fluter No. 95, doz	\$8.00
Combined Fluter and Sad Iron	doz \$15.00
<b>Holsting—</b>	
Moore's Hand Holst, with Lock Brake	20%
Moore's Anti-Friction Differential Pulley Block	20%
Moore's Rope Differential Pulley Block	60%
Energy Mfg. Co.'s	25%
See also Blocks.	
<b>Washing—</b>	
Anthony Wayne	doz, No. 1, \$42; No. 2, \$30; No. 3, \$42
Wayne American	doz \$38.00
Western Star	doz, No. 2, \$38; No. 3, \$39
Wellsell	doz \$54.00
Fair and Square	doz \$42.00
<b>Mallets—</b>	
Hickory	20&10&20&10&10%
Lignumvite	20&10&20&10&10%
B. & L. Block Co., Hickory & L. V.	80&30&10
<b>Mattocks—Regular list.</b>	
	60&10&60&10&2%
<b>Measures—</b>	
Standard Fiberware, No. 1, peck	dozen, \$5.50; 1/2 peck, \$3.00
<b>Meat Cutters—</b>	
See Cutters, Meat.	
<b>Menders, Harness—</b>	
Per doz.	\$2.00
<b>Milk Cans—See Cans, Milk.</b>	

<b>Mills—</b>	
<b>Coffee—</b>	
Box and Side, list Jan. 1, 1888	60&60&5%
Net prices are often made which are lower than above discount.	
American, Enterprise Mfg. Co., list Jan. 17, 1893.	20%
The Swift, Lane Bros.	30%
Waddell's New Box Mills, Ideal Brand, New List.	60%
<b>Mincing Knives—</b>	
See Knives, Mincing.	
<b>Molasses Gates—</b>	
See Gates, Molasses.	
<b>Money Drawers—</b>	
See Drawers, Money.	
<b>Mowers, Lawn—</b>	
Best Machines: 10-in., \$4; 12-in., \$4.50; 14-in., \$5; 16-in., \$5.50; 18-in., \$6.	
Low-Grade Machines:	
10-in. \$3; 12-in., \$3.25 14-in., \$3.50 each	
<b>Muzzles—</b>	
Safety	doz, \$3.00, 25%
<b>Nails.—</b>	
Cut and Wire. See Trade Report.	
Wire Nails, Papered.	
Association list, May 1, 192, 30&10&10&5%	
Tack Mfrs.' list	70&5&70&10%
Hungarian, Finishing, Upholsterers', &c.	See Tacks.
<b>Horse—</b>	
Nos. 6 9 10	
American	1/4 1/2 3/4 1 1 1/2 1 3/4 2 2 1/2 3 3 1/2 4 4 1/2 5 5 1/2 6 6 1/2 7 7 1/2 8 8 1/2 9 9 1/2 10 10 1/2 11 11 1/2 12 12 1/2 13 13 1/2 14 14 1/2 15 15 1/2 16 16 1/2 17 17 1/2 18 18 1/2 19 19 1/2 20 20 1/2 21 21 1/2 22 22 1/2 23 23 1/2 24 24 1/2 25 25 1/2 26 26 1/2 27 27 1/2 28 28 1/2 29 29 1/2 30 30 1/2 31 31 1/2 32 32 1/2 33 33 1/2 34 34 1/2 35 35 1/2 36 36 1/2 37 37 1/2 38 38 1/2 39 39 1/2 40 40 1/2 41 41 1/2 42 42 1/2 43 43 1/2 44 44 1/2 45 45 1/2 46 46 1/2 47 47 1/2 48 48 1/2 49 49 1/2 50 50 1/2 51 51 1/2 52 52 1/2 53 53 1/2 54 54 1/2 55 55 1/2 56 56 1/2 57 57 1/2 58 58 1/2 59 59 1/2 60 60 1/2 61 61 1/2 62 62 1/2 63 63 1/2 64 64 1/2 65 65 1/2 66 66 1/2 67 67 1/2 68 68 1/2 69 69 1/2 70 70 1/2 71 71 1/2 72 72 1/2 73 73 1/2 74 74 1/2 75 75 1/2 76 76 1/2 77 77 1/2 78 78 1/2 79 79 1/2 80 80 1/2 81 81 1/2 82 82 1/2 83 83 1/2 84 84 1/2 85 85 1/2 86 86 1/2 87 87 1/2 88 88 1/2 89 89 1/2 90 90 1/2 91 91 1/2 92 92 1/2 93 93 1/2 94 94 1/2 95 95 1/2 96 96 1/2 97 97 1/2 98 98 1/2 99 99 1/2 100 100 1/2 101 101 1/2 102 102 1/2 103 103 1/2 104 104 1/2 105 105 1/2 106 106 1/2 107 107 1/2 108 108 1/2 109 109 1/2 110 110 1/2 111 111 1/2 112 112 1/2 113 113 1/2 114 114 1/2 115 115 1/2 116 116 1/2 117 117 1/2 118 118 1/2 119 119 1/2 120 120 1/2 121 121 1/2 122 122 1/2 123 123 1/2 124 124 1/2 125 125 1/2 126 126 1/2 127 127 1/2 128 128 1/2 129 129 1/2 130 130 1/2 131 131 1/2 132 132 1/2 133 133 1/2 134 134 1/2 135 135 1/2 136 136 1/2 137 137 1/2 138 138 1/2 139 139 1/2 140 140 1/2 141 141 1/2 142 142 1/2 143 143 1/2 144 144 1/2 145 145 1/2 146 146 1/2 147 147 1/2 148 148 1/2 149 149 1/2 150 150 1/2 151 151 1/2 152 152 1/2 153 153 1/2 154 154 1/2 155 155 1/2 156 156 1/2 157 157 1/2 158 158 1/2 159 159 1/2 160 160 1/2 161 161 1/2 162 162 1/2 163 163 1/2 164 164 1/2 165 165 1/2 166 166 1/2 167 167 1/2 168 168 1/2 169 169 1/2 170 170 1/2 171 171 1/2 172 172 1/2 173 173 1/2 174 174 1/2 175 175 1/2 176 176 1/2 177 177 1/2 178 178 1/2 179 179 1/2 180 180 1/2 181 181 1/2 182 182 1/2 183 183 1/2 184 184 1/2 185 185 1/2 186 186 1/2 187 187 1/2 188 188 1/2 189 189 1/2 190 190 1/2 191 191 1/2 192 192 1/2 193 193 1/2 194 194 1/2 195 195 1/2 196 196 1/2 197 197 1/2 198 198 1/2 199 199 1/2 200 200 1/2 201 201 1/2 202 202 1/2 203 203 1/2 204 204 1/2 205 205 1/2 206 206 1/2 207 207 1/2 208 208 1/2 209 209 1/2 210 210 1/2 211 211 1/2 212 212 1/2 213 213 1/2 214 214 1/2 215 215 1/2 216 216 1/2 217 217 1/2 218 218 1/2 219 219 1/2 220 220 1/2 221 221 1/2 222 222 1/2 223 223 1/2 224 224 1/2 225 225 1/2 226 226 1/2 227 227 1/2 228 228 1/2 229 229 1/2 230 230 1/2 231 231 1/2 232 232 1/2 233 233 1/2 234 234 1/2 235 235 1/2 236 236 1/2 237 237 1/2 238 238 1/2 239 239 1/2 240 240 1/2 241 241 1/2 242 242 1/2 243 243 1/2 244 244 1/2 245 245 1/2 246 246 1/2 247 247 1/2 248 248 1/2 249 249 1/2 250 250 1/2 251 251 1/2 252 252 1/2 253 253 1/2 254 254 1/2 255 255 1/2 256 256 1/2 257 257 1/2 258 258 1/2 259 259 1/2 260 260 1/2 261 261 1/2 262 262 1/2 263 263 1/2 264 264 1/2 265 265 1/2 266 266 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433 1/2 434 434 1/2 435 435 1/2 436 436 1/2 437 437 1/2 438 438 1/2 439 439 1/2 440 440 1/2 441 441 1/2 442 442 1/2 443 443 1/2 444 444 1/2 445 445 1/2 446 446 1/2 447 447 1/2 448 448 1/2 449 449 1/2 450 450 1/2 451 451 1/2 452 452 1/2 453 453 1/2 454 454 1/2 455 455 1/2 456 456 1/2 457 457 1/2 458 458 1/2 459 459 1/2 460 460 1/2 461 461 1/2 462 462 1/2 463 463 1/2 464 464 1/2 465 465 1/2 466 466 1/2 467 467 1/2 468 468 1/2 469 469 1/2 470 470 1/2 471 471 1/2 472 472 1/2 473 473 1/2 474 474 1/2 475 475 1/2 476 476 1/2 477 477 1/2 478 478 1/2 479 479 1/2 480 480 1/2 481 481 1/2 482 482 1/2 483 483 1/2 484 484 1/2 485 485 1/2 486 486 1/2 487 487 1/2 488 488 1/2 489 489 1/2 490 490 1/2 491 491 1/2 492 492 1/2 493 493 1/2 494 494 1/2 495 495 1/2 496 496 1/2 497 497 1/2 498 498 1/2 499 499 1/2 500 500 1/2 501 501 1/2 502 502 1/2 503 503 1/2 504 504 1/2 505 505 1/2 506 506 1/2 507 507 1/2 508 508 1/2 509 509 1/2 510 510 1/2 511 511 1/2 512 512 1/2 513 513 1/2 514 514 1/2 515 515 1/2 516 516 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600 600 1/2 601 601 1/2 602 602 1/2 603 603 1/2 604 604 1/2 605 605 1/2 606 606 1/2 607 607 1/2 608 608 1/2 609 609 1/2 610 610 1/2 611 611 1/2 612 612 1/2 613 613 1/2 614 614 1/2 615 615 1/2 616 616 1/2 617 617 1/2 618 618 1/2 619 619 1/2 620 620 1/2 621 621 1/2 622 622 1/2 623 623 1/2 624 624 1/2 625 625 1/2 626 626 1/2 627 627 1/2 628 628 1/2 629 629 1/2 630 630 1/2 631 631 1/2 632 632 1/2 633 633 1/2 634 634 1/2 635 635 1/2 636 636 1/2 637 637 1/2 638 638 1/2 639 639 1/2 640 640 1/2 641 641 1/2 642 642 1/2 643 643 1/2 644 644 1/2 645 645 1/2 646 646 1/2 647 647 1/2 648 648 1/2 649 649 1/2 650 650 1/2 651 651 1/2 652 652 1/2 653 653 1/2 654 654 1/2 655 655 1/2 656 656 1/2 657 657 1/2 658 658 1/2 659 659 1/2 660 660 1/2 661 661 1/2 662 662 1/2 663 663 1/2 664 664 1/2 665 665 1/2 666 666 1/2 667 667 1/2 668 668 1/2 669 669 1/2 670 670 1/2 671 671 1/2 672 672 1/2 673 673 1/2 674 674 1/2 675 675 1/2 676 676 1/2 677 677 1/2 678 678 1/2 679 679 1/2 680 680 1/2 681 681 1/2 682 6

**Pullers, Nail-**

Serration. . . . . \$ doz., \$18.00, 38¢  
 Giant, No. 1. . . . . \$ doz., \$18.00, 10¢  
 Giant, No. 2. . . . . \$ doz., \$15.00, 10¢  
 Pelican. . . . . \$ doz., \$9.00, 25¢  
 Pelican. . . . . \$ doz., \$21.00, 40¢  
 Economy. . . . . \$ doz., \$6.00

**Pulleys-**

Hot House, Awning, &c. . . . . 60¢@70¢  
 Japanned Sorew. . . . . 80¢@10¢  
 Brass Sorew. . . . . 70¢  
 Japanned Side. . . . . 60¢@10¢  
 Moore's Side, Anti Friction. . . . . 50¢  
 Moore's Ceiling or End, Anti-Friction 40¢  
 Moore's Dumb Waiter, Anti-Friction 50¢  
 Moore's Electric Light. . . . . 30¢  
 Japanned Sorew. . . . . 80¢@10¢  
 Hay Fork, Solid Eye. \$4.00; Swivel. \$4.50. 60¢@10¢  
 Hay Fork, "Anti-Friction," 5 in. solid. \$5.70. 60¢@10¢  
 Hay Fork, "F" Common and Patent. 20¢  
 Hay Fork, Tarbox Pat. Iron. 20¢  
 Hay Fork, Reed's Self-Lubricating. 60¢  
 Hay Fork, Moore's Anti-Friction 5 in. Wheel. \$ doz., \$12.00. 40¢  
 Shade Rack. . . . . 40¢  
 Tackle Blocks-See Blocks.  
 Shepard's Niagara, No. 25. \$ doz 23¢ net  
 Sash (Anger Mortise). . . . . 60¢  
 Common Sense. . . . . 60¢  
 Empire. . . . . 60¢  
 Ideal, Nos. 2, 4, 10 & 16 } 30% less 1¢  
 Aome. } doz net.  
 Star. }  
 On dbl. lots extra 5%  
 Ideal, Nos. 25 and 55. \$ doz. 22¢ net.

**Pumps-**

Cistern, Best Makers. . . . . 60¢@80¢  
 Pitcher Spout, Best Makers. . . . . 67¢@70¢  
 Pitcher Spout, Cheaper G'ds. 75¢@75¢

**Punches-**

Saddler's or Drive, good. \$ doz., 60¢@65¢  
 Bemis & Call Co.'s Cast Steel Drive. 50¢@55¢  
 Bemis & Call Co.'s Springfield Socket. 65¢  
 Spring, good quality. \$ doz., \$2.60@2.80  
 Spring, Leach's Pat. . . . . 15¢  
 Bemis & Call Co.'s Spring. . . . . 50¢@55¢  
 Bemis & Call Co.'s Check. . . . . 55¢  
 Solid Timmers', P., S. & W. Co., \$ doz., \$1.44. 55¢  
 Timmers' Hollow Punches, P., S. & W. Co. \$ doz., 20¢@25¢  
 Rice Hand Punches. . . . . 15¢  
 Avery's Revolving. . . . . 40¢  
 Avery's Sawset and Punch-See Sawsets  
 Niagara Hollow Punches. . . . . 20¢@25¢  
 Niagara Solid Punches. . . . . 55¢

**Rail-**

Sliding Door, Wrt's Brass. \$ doz., 35¢, 40¢  
 Sliding Door, Bronzed Wrt's Iron. \$ ft., 7¢  
 Sliding Door, Iron, Painted. \$ ft., 4¢, 40¢  
 Barn Door, Light. In. \$ 3¢ 3/4  
 Per 100 feet. \$2.00 2.50 3.10, 10¢  
 B. D. for N. E. Hand. Small. Med. Large.  
 Per 100 feet. \$3.15 2.70 3.25 Net

Terry's Steel Rail. \$ ft., 4¢  
 Victor Track Rail, 7¢ per foot. 50¢@55¢  
 Carrier, double braced, Steel Rail. \$ doz., 40¢  
 Lundy Parlor Door, Plated Edge. \$ 7¢  
 Moore's Steel Rail. . . . . 25¢@10¢  
 Moody Steel Rail \$ ft., 6¢. 45¢

**Rakes-**

Cast Steel, Association C'ds. 70¢@70¢@5¢  
 Cast Steel, outside g'ds. 70¢@70¢@5¢  
 Malleslie. . . . . 70¢@70¢@5¢  
 Gibbs' Lawn Rake. \$ doz., \$4.90  
 Gibbs' Canton Lawn Rake. \$ doz., \$4.75  
 Gibbs' Acme Lawn Rake. \$ doz., \$4.75  
 Gibbs' Favorite Lawn Rake. \$ doz., \$3.90  
 Gibbs' Crown Lawn Rake, No. 1. \$ doz., \$4.90; No. 2, \$3.40  
 Oneida Lawn Rake. \$ doz., \$6.00  
 Fort Madison Prize Bow Brace. 65¢  
 Peerless. . . . . 65¢  
 Fort Madison Steel Tooth Lawn Rake. \$ doz., \$6.00. 25¢

**Razors-**

J. B. Torrey Razor Co. . . . . 20¢  
 Wostenholm and Butcher. \$10 to 20. 10¢  
 Jordan's AAA, new list. . . . . 10¢  
 Net Jordan's Old Faithful, new list. . . . . Net  
 Galvanic. . . . . \$ doz., \$15.00  
 Electro Cutlery Co. . . . . Net  
 Campbell Cutlery Co. . . . . 50¢

**Razor Straps-**

See Straps, Razor.

**Registers -**

Moore's Japanned. . . . . 75¢  
 Moore's Electroplated. . . . . 75¢  
 Moore's Bronze Finishes. . . . . 70¢  
 Moore's Solid Bronze. . . . . 65¢  
 Moore's Stove Pipe. . . . . 35¢

**Rings and Ringers-**

**Bull Rings-**  
 Union Nut Co. . . . . 55¢  
 Sargent's. . . . . 75¢@10¢  
 Hotchkiss' low list. . . . . 30¢  
 Humason & Beckley & Co. \$ doz., \$1.75  
 Peck, Stow & W. Co.'s. 50¢@10¢@10¢  
 Ellrich Hdw. Co., White Metal, low list. 50¢@10¢

**Hog-**

Top of the Hill Ringers. . . . . \$ doz \$2.00  
 Top of the Hill Rings. . . . . \$ doz \$1.25  
 Hill's Improved Ringers. . . . . \$ doz \$1.25  
 Hill's Old Style Ringers. . . . . \$ doz \$1.25  
 Hill's Tongue. . . . . \$ doz \$3.00  
 Hill's Rings. . . . . \$ doz \$1.00  
 Perfect Rings. . . . . \$ doz \$1.50  
 Perfect Ringers. . . . . \$ doz \$2.15@2.25  
 Blair's Hog Ringers. . . . . \$ doz \$2.00  
 Blair's Hog Rings. . . . . \$ doz 90¢@1.00  
 Champion Ringers. . . . . \$ doz \$2.25  
 Champion Rings, Double. . . . . \$ doz \$2.25  
 Brown's Ringers. . . . . \$ doz \$1.15@1.25  
 Brown's Rings. . . . . \$ doz \$1.15@1.25  
 Electric Hog Rings. . . . . \$ doz boxes \$1.50  
 Electric Hog Ringers. . . . . \$ doz \$2.00  
 Major Rings. . . . . \$ doz \$1.25  
 Major Ringers. . . . . \$ doz \$2.00

**Rivets and Burrs-**

Norway Iron list Nov. 17, '87. . . . . 60¢@10¢  
 Second quality. . . . . 70¢  
 Copper. . . . . 60¢@80¢  
 Coppered Iron, Bettina Brand. . . . . 50¢@5¢

**Rivet Sets-See Sets.****Roasting and Baking Pans-See Pans, Roasting and Baking.****Rods-**

Star, Brass. . . . . 25¢@30¢  
 Star, Black Walnut. . . . . \$ doz 40¢

**Rollers-**

Burn Door, Sargent's list. . . . . 60¢@10¢  
 Aime Moore's Anti-Friction. . . . . 55¢  
 Udon Burn Door Roller. . . . . 70¢  
 Moore's Burn Door Stay. . . . . 50¢  
 Thompson Mfg. Co.'s Lawn Rollers. . . . . 30¢

**Rope-**The following prices are f.o.b. New York or factory, and are shaded 1/4¢@3/4¢ on large lots; terms, 1 1/2% for cash.  
 Manila, 7-16 in. diam. and larger. \$ 8 1/4¢  
 Manila, 1/2 in. . . . . 9¢  
 Manila, 1/4 and 5-16 in. . . . . 9 1/4¢  
 Manila, Tarred Rope. . . . . 8¢  
 Manila, Hay Rope. . . . . 8¢  
 Sisal, 7-16 inch and larger. \$ 7 1/4¢  
 Sisal, 1/2 in. . . . . 7 1/4¢  
 Sisal, 1/4 and 5-16 in. . . . . 8¢  
 Sisal, Hay Rope. . . . . 7 1/4¢  
 Sisal, Tarred Rope. . . . . 6 3/4¢  
 Sisal, Medium Lath Yarn. . . . . 6 3/4¢  
 New Zealand, 7-16 in. & larger. \$ 6 3/4¢  
 New Zealand, 1/2 and 5-16 inch. \$ 7 1/4¢  
 New Zealand, Hay Rope. . . . . 6 1/4¢  
 New Zealand, Tarred Rope. . . . . 6¢  
 Cotton Rope. . . . . \$ 13 1/4¢  
 Jute Rope. . . . . \$ 6 1/4¢

**Wire-**

List February, 1892. All kinds. . . . . 45¢

**Rules-**

Boxwood. . . . . 80¢@10¢@10¢@10¢@10¢  
 Ivory. . . . . 50¢@10¢  
 Starrett's Steel Rules and Straight Edges. . . . . 25¢@10¢

**Sad Irons-See Irons, Sad.****Sand and Emery Paper and Cloth-**

See Paper and Cloth.

**Sash Cord-See Cord, Sash.****Sash Locks-See Locks, Sash.****Sash Weights-**

See Weights, Sash.

**Sausage Stuffers or Fillers-**

See Stuffers or Fillers.

**Saws-**

Diston's Circular. . . . . 45¢@45¢@5¢  
 Diston's Cross Cut, list Jan. 1, '93. 40¢@10¢  
 Diston's Hand. . . . . 25¢  
 Woodrough & McFarlin. . . . . 25¢@10¢  
 Hand, Panel and Rip. . . . . 45¢@10¢  
 Cross Cuts, list Jan. 1, 1893. . . . . 45¢@10¢  
 Wheeler, Madden & Clemons Mfg. Co. Hand, Panel and Rip. . . . . 30¢@10¢  
 Cross Cuts, list Jan. 1, 1893. . . . . 45¢@10¢  
 Atkins' Circular. . . . . 50¢@10¢  
 Atkins' Cross Cuts, new list. . . . . 40¢  
 Atkins' Muley, Mill and Drag. . . . . 50¢@10¢  
 Atkins' One-Man Saw. . . . . 40¢  
 Atkins' Wood Saws. . . . . 40¢  
 Peace Circular and Mill. . . . . 45¢@45¢@5¢  
 Peace Hand Panel and Rip. . . . . 25¢@25¢@5¢  
 Peace Cross Cuts, list Jan. 1, '93. . . . . 45¢@10¢  
 Richardson's Circular and Mill. 45¢@45¢@5¢  
 Richardson's Cross Cuts, list Jan. 1, '93. 45¢@10¢  
 Richardson's Hand, &c. . . . . 25¢@25¢@5¢  
 C. E. Jennings & Co.'s

**Hack Saws-**

Griffin's, complete. . . . . 40¢@10¢  
 Griffin's Hack Saw Blades. . . . . 40¢@10¢  
 Star Hack Saws and Blades. . . . . 25¢  
 Eureka and Crescent. . . . . 25¢

**Scroll-**

Lester, complete, \$10.00. . . . . 25¢  
 Rogers, complete, \$4.00. . . . . 25¢  
 Barnes' Builders' and Cab Makers' \$15.25  
 Barnes' Scroll Saw Blades. . . . . 35¢

**Saw Frames-**

See Frames, Saw.

**Saw Sets-See Sets, Saw.****Saw Tools-See Tools, Saw.****Scales-**

Hatch, Counter, No. 171, good quality. \$ doz \$18.00@17.00  
 Hatch, Tea, No. 161. . . . . \$ doz \$6.50@6.00  
 Union Platform, Plain. . . . . \$2.10@2.20  
 Union Platform, Striped. . . . . \$2.40@2.50  
 Chaitillon's Grocers' Trip Scales. . . . . 50¢  
 Chaitillon's Eureka. . . . . 25¢  
 Chaitillon's Favorite. . . . . 40¢  
 Family, Turnbills. . . . . 30¢@10¢  
 Riehle Bros', Platform. . . . . 40¢

**Scale Beams-**

See Beams, Scale.

**Scissors, Fluting. . . . . 45¢****Scrapers-**

Adjustable Box Scraper (S. R. & L. Co.) \$ doz. 30¢@10¢  
 Box, 2 Handle. . . . . \$ doz \$3.00@3.25  
 Box, 2 Handle. . . . . \$ doz \$3.00@3.25  
 Deane Box and Ship. . . . . 20¢@10¢  
 Foot. . . . . 60¢@10¢  
 Ship, Common. . . . . \$ doz \$3.50 net  
 Ship, R. I. Tool Co. . . . . 10¢

**Screen Window and Door**

Frames-See Frames

**Screw Drivers-**

See Drivers, Screw

**Screws-****Bench and Hand-**

Bench, Iron. . . . . 55¢@10¢@55¢@10¢  
 Bench, Wood, Beech. . . . . \$ doz \$2.25  
 Bench, Wood, Hickory. . . . . 20¢  
 Hand, Wood. . . . . 55¢@10¢@25¢@10¢  
 Hand, Grand Rapids, list. . . . . 35¢

**Coach, Lag and Hand-Rail-**

Lag, Blunt Point, list Jan. 1, 1890. . . . . 80¢@80¢  
 Coach and Lag, Gimlet Point, list Jan. 1, 1890. . . . . 80¢@80¢  
 Hand Rail, Sargent's. . . . . 70¢@10¢  
 Hand Rail, H. & B. Mfg. Co. . . . . 70¢@10¢  
 Hand Rail, Am. Screw Co. . . . . 75¢

**Jack Screws-**

Jack Screws, Millers Falls list. 50¢@50¢  
 Jack Screws, P. S. & W. . . . . 35¢  
 Jack Screws, Sargent. . . . . 70¢  
 Jack Screws, Stearns. . . . . 40¢@40¢

**Cork-**

Humason & Beckley Mfg. Co. 40¢@10¢  
 Williamson's. . . . . 35¢@35¢  
 Detroit Cork Screw Co. . . . . 35¢

**Machine-**

Flat Head Iron. . . . . 65¢  
 Round Head Iron. . . . . 60¢

**Wood-**

List January 1, 1891.  
 Flat Head Iron. . . . . 70¢  
 Round Head Iron. . . . . 65¢  
 Flat Head Brass. . . . . 70¢  
 Round Head Brass. . . . . 65¢  
 Flat Head Bronze. . . . . 70¢  
 Round Head, Bronze. . . . . 65¢  
 Rogers' Drive Screws. . . . . 82¢

**Scroll Saws-See Saws, Scroll.****Scythes-**

Grain. . . . . 40¢@5¢@40¢@10¢  
 Grass. . . . . 40¢@10¢@50¢

**Scythe Snaths-**

See Snaths, Scythe.

**Sets-****Awl and Tool-**

Alken's Sets, Awls and Tools, No. 20. \$ doz \$10.00. 60¢@60¢  
 Fray's Adj. Tool Hds., Nos. 1, \$12; 2, \$18; 3, \$12; 4, \$9. 45¢  
 Millers Falls, 1 1/2" Tool Hds., Nos. 1, \$12; 2, \$18. 25¢  
 Henry's Combination Haft. \$ doz \$6.50  
 Stanley's Excelsior. . . . . 30¢@10¢  
 No. 1, \$7.50; No. 2, \$4.00; No. 3, \$5.50. 30¢@10¢  
 Common Brad Sets, No. 42, \$10.50; No. 43, \$12.50. 70¢@10¢

**Nail-**

Square. . . . . \$ gr \$4.00@4.25  
 Round. . . . . \$ gr \$3.25  
 Buck Bros. . . . . \$ gr \$2.75  
 Cannon's Diamond Point. \$ gr \$12, 20¢

**Regular list. . . . . 70¢****Saw-**

Stillman's Genuine. \$ doz \$5.00@7.75. 40¢@5¢  
 Stillman's Pattern, Hand, \$ doz \$3.85@4.00  
 Cross Cut, \$ doz \$5.55@5.10  
 Common Lever. \$ doz \$2.00, 45¢@50¢  
 Morrill's No. 1, \$15.00. 40¢@20¢  
 No. 11, \$16.00. 40¢@20¢  
 Nos. 3 and 4, Cross Cut, \$23.00. 40¢@20¢  
 No. 6, Mill, \$51.00. 40¢@20¢  
 No. 10, \$15.00. 40¢@20¢  
 Leach's, No. 0, \$8.00; No. 1, \$15. 15¢@20¢  
 Nash's, No. 0, \$8.00. 20¢@10¢@20¢@10¢  
 Hammer, Hotchkiss. . . . . \$5.50, 10¢  
 Hammer, Bemis & Call Co.'s new Pat. 45¢  
 Bemis & Call Co.'s Plate. . . . . 20¢  
 Bemis & Call Co.'s Cross Cut. . . . . 20¢  
 Aiken's Genuine. . . . . \$13.00, 55¢@55¢  
 Aiken's Imitation. . . . . \$9.00, 55¢@55¢  
 Hart's Pat. Lever. . . . . 20¢  
 Diston's Star. . . . . 25¢  
 Leopold. . . . . 40¢@10¢  
 Atkins' Lever. . . . . \$ doz No. 1, \$6.00  
 Atkins' Criterion. . . . . \$ doz No. 1, \$6.00  
 Crescent (Keller), No. 1, \$15.00. No. 2, \$24.00. 40¢@10¢  
 Avery's Saw Set and Punch. . . . . 50¢  
 Kohler's Royal. . . . . \$ doz \$7.00  
 Kohler's Giant Royal. . . . . \$ doz \$12.00  
 Crescent. . . . . \$ doz \$5.00  
 Lloyd's Acme. . . . . \$ doz \$15. 40¢@10¢  
 Taintor Positive. . . . . \$ doz \$18, 50¢

**Sharpeners, Knife-**

Larkins'. . . . . \$ doz \$6.00, 40¢  
 Appletwood Handles. \$ doz \$9.00, 40¢  
 Rosewood or Cocobola. \$ doz \$9.00, 40¢

**Shaves, Spoke-**

Iron. . . . . 45¢  
 Wood. . . . . 30¢  
 Bailey's (Stanley R. & L. Co.). 40¢@10¢  
 Stearns'. . . . . 30¢@10¢  
 Cincinnati. . . . . 25¢@10¢  
 Goodell's \$ doz \$9.00. 25¢

**Shears-**

American (Cast) Iron. 75¢@10¢@75¢@10¢  
 Barnard's Lamp trimmers. \$ doz \$3.75  
 Seymour's, list Dec. 1881. . . . . 80¢@10¢@10¢@10¢  
 Heinsch's, list Dec. 1881. . . . . 60¢@10¢@10¢@10¢  
 Heinsch's Tailor's Shears. . . . . 35¢@4¢  
 Cast Steel Trimmers: . . . . . 80¢@80¢  
 First quality. . . . . 80¢@10¢@80¢@10¢  
 Acme Cast Shears. . . . . 10¢@10¢  
 Diamond Cast Shears. . . . . 10¢  
 Clipper. . . . . 10¢@10¢  
 Victor Cast Shears. . . . . 75¢@10¢@75¢@10¢  
 Howe Bros. & Hulbert, Solid Forged Steel Cutlery Co. Solid Steel Forged. 40¢  
 Hatch Cutlery Co. Solid Steel Forged. 60¢  
 Davenport Cutlery Co. . . . . 60¢@10¢  
 Claus brand, Japanned. . . . . 70¢  
 Claus brand, Nickel, same list. . . . . 60¢  
 Galvanic 3/4 to 9 in. \$ doz \$1.00 1/2 inch  
 Electric Cutlery Co. . . . . Net  
 Campbell Cutlery Co., Jap'd. 75¢  
 Nickel Plated. . . . . 65¢

**Timners' Snips-**

Wrt. Handles, Steel Blades. 20¢@20¢  
 Niagara Snips and Shears. . . . . 20¢@10¢  
 Cast Handles, Laid with Steel. . . . . 40¢

**Pruning Shears and Hook**

Diston's Combined Pruning Hook and Saw. \$ doz \$12.00, 20¢@10¢  
 Diston's Pruning Hook, \$ doz \$12.00. 20¢@10¢  
 E. S. Lee & Co.'s Pruning Tools. 50¢@10¢  
 Pruning Shears, Henry's Pat. \$ doz \$3.75@3.90  
 Henry's Pruning Shears. \$ doz \$4.25 @4.4¢  
 Wheeler, M. & C. Co., Combination. \$ doz \$12.00  
 Dunlap's Saw and Chisel. \$ doz \$3.50, 80¢  
 J. Mallinson & Co., No. 1, \$5.25; No. 2, \$7.50  
 P. S. & W. Co. . . . . 60¢  
 Levin Pruner No. 1, \$15.00 \$ doz \$4.25  
 Levin Pruner No. 2, \$21.00 \$ doz \$4.25

**Timmers' &c.-**

Shears and Snips (P. S. & W.). 20¢@20¢  
 Snips, J. Mallinson & Co. . . . . 85¢@4¢

**Sheaves-****Sliding Door-**

M. W. Co., list July, 1888. 50¢@10¢@60¢  
 R. & E., list Dec. 18, 1885. . . . . 55¢@20¢  
 Co. Point's list. . . . . 60¢@10¢  
 Patent Roller. . . . . 60¢@10¢  
 Patent Roller, Hatfield's. . . . . 75¢  
 Russell's Anti-Friction, list Dec. 18, 1885. . . . . 60¢@10¢  
 Moore's Anti-Friction. . . . . 50¢

**Sliding Shutter-**

R. & E., list Dec. 18, 1885. . . . . 60¢@10¢  
 Sargent's list. . . . . 60¢@10¢  
 Reading list. . . . . 60¢@10¢

**Shells-**

First quality 4, 8, 10 and 12 gauge. 25¢@10¢  
 First quality Rival, Club and Climax brands, 13, 16 and 20 gauge (7.50 list). 20¢@10¢  
 Price. . . . . 40¢@10¢  
 Star, Club, Rival and Climax Brands. 35¢@10¢  
 Smokeless brand, 12, 10, 16 gauge. 35¢@10¢  
 Trap brand, 12 and 10 gauge. 35¢@10¢  
 Seibold's Comb. Shot Shells. . . . . 15¢@5¢  
 Brass Shot Shells, 1st quality. . . . . 60¢@5¢  
 Brass Shot Shells, Club, Rival, Climax. 65¢@10¢

**Shells, Loaded-**

Standard List, July 19, 1890. . . . . 5 40¢@10¢@10¢@10¢  
 7¢ cash, 10 day 5

**Ship Tools-**

L. & L. J. White. . . . . 30¢@10¢

**Shoes, Horse, Mule, &c.-****Horse-**

Burden's, Perkins', Phoenix, Standard, Diamond State, Bryden's Boss and Crescent, at factory. . . . . \$4.00  
 Bryden's Frog Pressure, at factory. \$5.00

**Mule-**

Add \$1 per keg to above prices.

**Ox Wrought-**

Ton lots. . . . . \$ 10 00  
 1000 lb lots. . . . . \$ 9 00  
 500 lb lots. . . . . \$ 8 00



**Snaps, Harness, &c.**

Anchor (T. & S. Mfg. Co.)	50¢
Fitch's (Bristol)	50¢
Motchkiss	10¢
Andrews	10¢
Sargent's Patent Guarded	70¢
German, new list	40¢
Covert	50¢
Covert, New Patent	50¢
Covert, New R. E.	60¢
Covert's Spring	60¢
Covert's Saddle Works' Triumph	33¢
John Protz Snaps	70¢
Kelley & Woolworth's Steel Harness	50¢

**Snaths**

Scythe	50¢
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**Soldering Irons**

See Irons, Soldering.

**Spittoons, Cuspidors, &c.****Standard Fiberware**

Cuspidors, 8 1/2-inch, 1/2 doz., No. 5, 38; No. 6, 39.

Spittoons, Daisy, 8-inch, No. 1, 4; 10 and 11 inch, 40.

Spoke Shaves—See Shaves, Spoke.

Spoke Trimmers—See Trimmers, Spoke.

**Spoons and Forks****Tinned Iron**

Basting, Cen. Stamp, Co.'s list, 70¢

Solid Table and Tea, Cen. Stamp, Co.'s list, 70¢

Buffalo, S. S. &amp; Co., 33¢

**Silver Plated**

4 months or 5¢ cash 30 days:

Meriden Brit. Co., Rogers, 40¢

C. Rogers &amp; Bros., 40¢

Rogers &amp; Bros., 40¢

Reed &amp; Barton, 40¢

Wm. Rogers Mfg. Co., 40¢

Simpson, Hall, Miller &amp; Co., 40¢

Holmes &amp; Edwards Silver Co., 40¢

L. Boardman &amp; Son, 50¢

**Miscellaneous**

Holmes &amp; Edwards Silver Co., 50¢

No. 67 Mexican Silver, 50¢

No. 80 Silver Metal, 50¢

No. 24 German Silver, 50¢

No. 60 Nickel Silver, 50¢

No. 49 Nickel Silver, 50¢

Wm. Rogers Mfg. Co., 50¢

Rogers' Silver Metal, 50¢

18¢ Rogers' German Silver, 60¢

22¢ Rogers' Nickel Silver, 50¢

German Silver, 50¢

German Silver, Hall &amp; Elton, 50¢

Nickel Silver, 50¢

Britannia, 60¢

Boardman's Nickel Silver, list July 1, 1891, 60¢

Boardman's Britannia Spoons, cash lots, 60¢

**Spring—Door**

Torrey's Rod, 39 in., 1/2 doz. \$1.20; 1/2 doz. \$1.50; No. 1, 1/2 doz. \$1.50; No. 2, 1/2 doz. \$1.50.

Gem (Coll), list April 19, 1893, 20¢

Star (Coll), list April 19, 1893, 20¢

Victor (Coll), 60¢

Champion (Coll), 60¢

Cowell's, No. 1, 1/2 doz. \$1.80; No. 2, 1/2 doz. \$1.80.

Rubber, complete, 1/2 doz. \$4.50.

Hercules, 50¢

Phoenix, 33¢

**Carriage, Wagon, &c.**

Elliptic, Concord, Platform and Half Scroll, 60¢

Cliff's Bolster Springs, 25¢

**Squares**

Steel and Iron, 80¢

Try Square and T Bevels, 60¢

Dixon's Try Square and T Bevels, 60¢

Wintbottom's Try and Miter, 30¢

Barrett's Micrometer Caliper Squares, 25¢

Avery's Flush Bevel Squares, 40¢

Avery's Bevel Protractor, 50¢

**Squeezers****Fodder**

Blair's, 1/2 doz. \$2.00

Blair's "Climax", 1/2 doz. \$1.25

**Lemon**

Orcelain Lined, No. 1, 1/2 doz. \$6.00

Wood, No. 2, 1/2 doz. \$3.00

Wood, Common, 1/2 doz. \$1.70

Dunlap's Improved, 1/2 doz. \$3.75

Bamala, No. 1, 1/2 doz. \$5.00; No. 2, 1/2 doz. \$5.00.

Jennings' Star, 1/2 doz. \$2.50

The Boss, 1/2 doz. \$2.50

Dean's, Nos. 1, 1/2 doz. \$6.50; 2, 1/2 doz. \$6.50.

Little Giant, 50¢

King, 40¢

Hotchkiss Straight Flash, 1/2 doz. \$12.00

Silver &amp; Co., Glass, 1/2 doz. \$9.00

**Standard Fiber Ware**

See Ware, Standard Fiber.

**Staples**

Barbed Blind, 1/2 in. and larger, 1/2 doz. \$7.45

Barbed Blind, 1/2 in., 1/2 doz. \$8.95

Fence Staples, Galvanized, Same price

Fence Staples Plain, Same price

Grand Crossing Tack Co.'s list, 75¢

**Steelyards****Stocks and Dies**

Blacksmith's: Waterford Goods, 35¢

Butterfield's Goods, 35¢

Lighting Screw Plates, 25¢

Reese's New Screw Plates, 25¢

Reversible Ratchet, 30¢

Gardner, 25¢

Green River, 30¢

Stops, Bench—

Morrell's, 1/2 doz. No. 1, \$10.00; No. 2, \$11.00

Motchkiss, 1/2 doz. \$5.10

Weston's, No. 1, 1/2 doz. \$5.10

Weston's, No. 2, 1/2 doz. \$5.10

McGill's, 1/2 doz. \$3.10

Inchmullin, 1/2 doz. \$3.10

Terrell's Nos. 1 and 2, 1/2 doz. \$3.10

Terrell's, 1/2 doz. \$3.10

Millers Falls, 1/2 doz. \$3.10

Stearns', 1/2 doz. \$3.10

**Stone****Scythe Stones**

Pike Mfg. Co., list April, 1892, 33¢

Cleveland Stone Co., list Nov. 1892, 33¢

**Oil Stones, &c.**

Pike Mfg. Co., Hindostan No. 1, 1/2 doz. \$4.00

Sand Stone, 1/2 doz. \$4.00

Turkey Oil Stone, 4 to 8 in., 1/2 doz. \$4.00

Turkey Slips, 1/2 doz. \$4.00

Lily White Washita, 1/2 doz. \$4.00

Rosy Red Washita, 1/2 doz. \$4.00

Washita Stone, Extra, 1/2 doz. \$4.00

Washita Stone, No. 1, 1/2 doz. \$4.00

Lily White Slips, 1/2 doz. \$4.00

Rosy Red Slips, 1/2 doz. \$4.00

Washita Slips, Extra, 1/2 doz. \$4.00

Washita Slips, No. 1, 1/2 doz. \$4.00

Arkansas Stone, No. 1, 3 to 5 in., 1/2 doz. \$4.00

Arkansas Stone, No. 1 1/2 to 3 in., 1/2 doz. \$4.00

Lake Superior, 1/2 doz. \$4.00

Lake Superior Slips, 1/2 doz. \$4.00

**Stove Polish**

See Polish, Stove.

**Stretchers Carpet**

Cast Steel, Polished, 1/2 doz. \$2.25

Cast Iron, Steel Points, 1/2 doz. \$2.25

Socket, 1/2 doz. \$2.25

Electric Cutlery Co., 1/2 doz. \$2.25

**Strops, Razor**

Genuine Emerson, 1/2 doz. \$2.00

Imitation, 1/2 doz. \$2.00

Torrey's, 1/2 doz. \$2.00

Badger's Belt and Com., 1/2 doz. \$2.00

Lamont Combination, 1/2 doz. \$2.00

Jordan's Fat, Padded, list Nov. 1, '89, 50¢

Campbell Cutlery Co., Net

**Stuffer, Sausage**

Miles' Challenge, 1/2 doz. \$2.00

Perry, 1/2 doz. \$2.00

\$21.00, 50¢

Draw Cut No. 4, each \$30.00, 20¢

Enterprise Mfg. Co., list Jan. 17, '93, 25¢

Silver's, 40¢

**Sweepers, Carpet and Lawn****Carpet**

Bissell No. 5, 1/2 doz. \$17.00

Bissell No. 8, 1/2 doz. \$17.00

Bissell, Grand, 1/2 doz. \$17.00

Standard, 1/2 doz. \$17.00

Domestic, 1/2 doz. \$17.00

Domestic, No. 2, 1/2 doz. \$17.00

Grand Rapids, 1/2 doz. \$17.00

Crown Jewel, No. 1, 1/2 doz. \$17.00

Magic, 1/2 doz. \$17.00

Improved Parlor Queen, 1/2 doz. \$17.00

Nickel, 1/2 doz. \$17.00

Japanned, 1/2 doz. \$17.00

Excelsior, 1/2 doz. \$17.00

Garland, 1/2 doz. \$17.00

Parlor Queen, 1/2 doz. \$17.00

Housewife's Delight, 1/2 doz. \$17.00

Ladies' Friend, 1/2 doz. \$17.00

Ladies' Friend No. 2, 1/2 doz. \$17.00

Advance, 1/2 doz. \$17.00

Our Leader, 1/2 doz. \$17.00

Triumph, 1/2 doz. \$17.00

Goody, 1/2 doz. \$17.00

Supreme, 1/2 doz. \$17.00

Easy, 1/2 doz. \$17.00

Gilt Edge, 1/2 doz. \$17.00

Acme, 1/2 doz. \$17.00

Imperial, 1/2 doz. \$17.00

Grand Republic, 1/2 doz. \$17.00

The Star, 1/2 doz. \$17.00

Reliable, 1/2 doz. \$17.00

The Rapid, 1/2 doz. \$17.00

Our Own, 1/2 doz. \$17.00

Model, 1/2 doz. \$17.00

Goshen Sweeper Company, Grand

Rapids, Mich., make the following re-

bates: 5 dozen in 6 months, 1/2 doz. \$1.00

10 dozen in 6 months, 1/2 doz. \$2.00

25 dozen in 6 months, 1/2 doz. \$3.00

Except on L.F., when 10 dozen price is \$15.50, and 25 dozen \$13.00.

**Lawn**

Thompson Mfg. Co., 30¢

**Swings**

Davies Lawn, 25¢

**Tacks, Brads &c.**

List October 19, 1889. Old established

straight weights. Short Weight goods

Carpet Tacks

American, Blued, 60¢

American, Tin'd and Cop'd, 70¢

Steel, Bright and Blued, 60¢

Steel, Tinned and Coppered, 70¢

Swedes Iron, Blued, 72¢

Swedes Iron, Tinned, 75¢

American Iron Tacks, Domestic, 60¢

Swedes Iron Tacks—

S. S., Blued, 60¢

S. S., Tinned, 70¢

Lanc., Blued, 55¢

Lanc., Tinned, 60¢

Lanc., Blued, 60¢

Lanc., Tinned, 60¢

Basket and Trimmers' Tacks—

Lanc., 52¢

S. S., 60¢

Hungarian Nails, 60¢

Common and Patent Brads, 55¢

Leathered Tacks, 10¢

Brush Tacks, S. S., 60¢

Looking Glass Tacks, S. S., 35¢

Picture Frame Points, S. S., 85¢

Finishing Nails, 60¢

Trunk and Clout Nails—

Black, 60¢

Tinned or Coppered, 67¢

Basket Nails, 60¢

Chair Nails, 52¢

Cigar Box Nails, 45¢

Tin Capped Nails, 50¢

Miscellaneous—

Double Point, 90¢

Wire Carpet Nails, 50¢

Claw Handle Carpet, 1/2 doz. \$4.00

Bonnie Blue, 1/2 doz. \$1.50

Bill Nye Brad Box, 4 00

Parisian Gilt Nails, cartoon, 50

Home Tacks, No. 50, 1/2 case (12 car-

tons), \$36.00; No. 100, 1/2 case

(12 cartons), \$72.00.

Home Nails, No. 200, 1/2 case (12 car-

tons), \$30.00; No. 400, 1/2 case (12

cartons), \$60.00.

Upholsterers' Nails, 50¢

**Wire Brads and Nails**

Steel-Wire Brads, R. &amp; E. Mfg. Co.'s list

See also Nails, Wire.

**Tanks, Oil**

Emerald, S. S. &amp; Co.: 80-gal. \$8.75; 60-

gal. \$11 each. 50¢

**Tapes, Measuring**

American, 40¢

Spring, 40¢

Chesterman's, Regular list, 25¢

**Thermometers**

Tin Case, 80¢

**Thimble Skelns—See Skelns****Ties, Bale—Steel**

Standard Wire, list, 50¢

**Tinners' Shears, &c**

See Shears, Tinners' &amp;c.

**Tinware**

Stamped, Japanned and Pleased, list

Jan. 20, 1887, 70¢

**Tire Benders, Upsetters, &c.**

See Benders and Upsetters, Tire.

**Tobacco Cutters**

See Cutters, Tobacco.

**Tools—Coopers'**

Bradley's, 20¢

Barton's, 30¢

L. &amp; J. White, 20¢

**Whips**

American Whip Co.	Length	4 1/2	5	5 1/2	6	6 1/2	7	7 1/2	8 ft.
X. L. Whalbone Driving	.....	\$18.00	20.00	22.00	24.00	27.00	30.00	33.00	36.00
Bureks, Two-thirds Whalbone	.....	15.00	16.50	18.00	20.00	.....	.....	.....	.....
Bull Bone, Half-length Whalbone	.....	.....	.....	11.00	12.00	13.00	15.00	.....	.....
American Standard	.....	8.00	8.50	9.00	10.00	12.00	13.50	15.00	16.50
True Grip, Raw Hide Center	.....	6.00	6.00	6.50	7.00	7.50	9.00	.....	.....
New Name, Stocked Java, Black and Wine Colors	.....	.....	.....	6.00	.....	.....	.....	.....	.....
American, 98 Pen Whip	.....	.....	.....	6.00	.....	.....	.....	.....	.....
Gents' Light Driving No. 111	.....	.....	.....	6.00	.....	.....	.....	.....	.....
Gents' Light Driving No. 106	.....	.....	.....	5.00	.....	.....	.....	.....	.....
Hand-made Stocked Java No. 103	.....	.....	8.75	4.00	.....	.....	.....	.....	.....
A large variety of cheaper grades	.....	.....	.....	.....	.....	.....	.....	.....	.....
Team Whips	.....	.....	.....	.....	.....	.....	.....	.....	.....
Toy Whips	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hardware Assortment, 10/American, 75 Whips for \$50.00.	.....	.....	.....	.....	.....	.....	.....	.....	.....

Per dozen.

**Wire and Wire Goods—****Iron—**

Market.	Br. & Ann.	Nos. 0 to 18.	Extra 5¢ to 10¢
Br. & Ann.	Nos. 0 to 18.	75¢ to 10¢	often given
Cop'd, Nos. 0 to 18.	75¢ to 10¢	often given	prices often
Galv., Nos. 0 to 18.	70¢ to 10¢	made on	large lots.
Tin'd, Nos. 0 to 18.	70¢ to 10¢	made on	large lots.

Stone, Br. and Ann'd.	.....	80%	Extra 10%
Nos. 16 to 18.	.....	80%	often given.
Nos. 19 to 21.	.....	82%	.....
Nos. 22 to 38.	.....	82%	.....
Tinned Broom Wire, 18 to 21.	.....	43%	.....
Galvanized Fence	.....	75¢ to 10¢	.....
Brass, list Jan. 18, 1884.	.....	40¢ to 55¢	.....
Copper, list Jan. 18, 1884.	.....	40¢ to 55¢	.....
Malin's An'ated & Tin'd on Spools.	.....	60%	.....
Malin's Brass and Cop. on Spools.	.....	50¢ to 55¢	.....
Ossawan Mills, An'd and Tinned on Spools.	.....	60¢ to 10%	.....

Ossawan Mills, Brass and Copper on Spools. 50¢ to 10%  
 Tinned Broom Wire, 18 to 21. 43%  
 Tate's Spooled Cop. and Brass. 50%  
 Cast Steel Wire. 50%  
 Stubs' Steel Wire. \$6.00 to 2, 30%  
 Steel Music Wire, 12 to 30, imported. 60¢ to 70¢

Wire Clothes Line, see Lines.  
 Wire Picture Cord, see Cord.

**Bright Wire Goods—**

Standard list. 85¢ to 85¢ to 10%

**Wire Cloth and Netting—**

Painted Screen Cloth 100 ft. \$1.75 to \$2.00  
 Galvanized Wire Netting. 75¢ to 75¢ to 10%

**Wire Barb—**

See Trade Report.

**Wire Rope—See Rope, Wire.****Wrenches—**

American Adjustable	.....	40%
Baxter's Adjustable "S"	.....	40% to 50%
Baxter's Diagonal	.....	60%
Coe's Genuine	.....	50% to 50% to 10%
Coe's "Mechanics"	.....	50% to 50% to 10%
Girard Standard	.....	50% to 50% to 10%
Lamson & Sessions' Engineers'	.....	60% to 70%
Lamson & Sessions' Standard	.....	60% to 70%
P. S. & W. Agricultural	.....	70% to 10%
Girard Agricultural	.....	75% to 10% to 80%
Lamson & Sessions' Agric'l.	.....	75% to 10% to 80%
W. & B. Diamond	.....	75% to 10% to 80%

**Bemis & Call's:**

Pat. Combination Bright	.....	40¢ to 55¢
Pat. Combination Black	.....	40¢ to 10%
Merrick's Pattern	.....	45%
Brigg's Pattern	.....	45% to 55%
Cylinder or Gas Pipe	.....	45% to 55%
No. 3 Pipe	.....	50% to 10%
Aiken's Pocket (Bright)	.....	\$3.00, 50% to 10%
The Favorite Pocket	.....	\$4.00, 40%
Webster's Pat. Combination	.....	50%
Boardman's	.....	50%
Always Ready	.....	50%
Alligator	.....	50% to 10%
Donohue's Engineer	.....	50% to 10%
Eagle	.....	50% to 10%
Acme, Bright	.....	50% to 10%
Acme, Nickel	.....	50% to 10%
Hercules	.....	70% to 70% to 55%
Walker's	.....	55% to 55%
Diamond Steel	.....	55% to 55%
Cincinnati Brass Wrenches	.....	55% to 10%
Taft's Vise Wrench	.....	55% to 10% to 55%

**Wringers, Clothes—**

Am. Wringer Co.'s list, July 1, 1893.	.....	2% cash
Calby Wringer Co., list Sept. 1, '91.	.....	2% cash
Lovel Mfg. Co., list July 1, 1892.	.....	2% cash
Peerless Mfg. Co., list Feb. 1, 1892.	.....	2% cash
National Wringer & Mfg. Co., list June 1, 1892.	.....	2% cash

**Wrought Goods—**

Staples, Hooks, &c., list March 17, 1893.	.....	85¢ to 10% to 55¢ to 11¢
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# Paints, Oils and Colors.—Wholesale Prices.

**Animal and Vegetable****Oils—**

Linseed, City, raw, per gal.	.....	50
Linseed, City, boiled	.....	53
Linseed, Western, raw	.....	48
Lard, City, Extra Winter	.....	74
Lard, City, Prime	.....	74
Lard, City, Extra No. 1	.....	65
Lard, City, No. 1	.....	55
Lard, Western, prime	.....	73
Cotton-seed, Crude, prime	.....	37
Cotton-seed, Crude, off grades	.....	34
Cotton-seed, Summer Yellow, prime	.....	42
Cotton-seed, Summer Yellow, off grades	.....	40
Sperm, Crude	.....	85
Sperm, Natural Spring	.....	85
Sperm, Bleached Spring	.....	1.00
Sperm, Natural Winter	.....	1.00
Sperm, Bleached Winter	.....	1.00
Whale, Crude	.....	55
Whale, Natural Winter	.....	55
Whale, Bleached Winter	.....	58
Whale, Extra Bleached	.....	59
Sea Elephant, Bleached	.....	59
Menhaden, Crude, Sound	.....	49
Menhaden, Crude, Southern	.....	49
Menhaden, Light Pressed	.....	42
Menhaden, Bleached W'ter	.....	45
Menhaden, Extra Bleached	.....	48
Tallow, City, prime	.....	60
Tallow, Western, prime	.....	60
Cocanut, Ceylon	.....	6
Cocanut, Cochiti	.....	6
Cod, Domestic	.....	38
Cod, Foreign	.....	42
Red Saponified	.....	44
Bank Saponified	.....	44
Bank Saponified, per gal	.....	6 1/2
Olive, Italian, bbls.	.....	58
Neatfoot, prime	.....	75
Palm, prime, Lagos	.....	74

**Mineral Oils—**

Black, 29 gravity, 25 @ 30 cold test	.....	7 @ 7 1/2
Black, 29 gravity, 15 cold test	.....	7 1/2 @ 8
Black, 29 gravity, summer	.....	6 @ 6 1/2
Cylinder, light, filtered	.....	14 @ 16

Cylinder, dark, filtered	.....	10 @ 13
Paraffine, 23 1/2 gravity	.....	11 @ 12
Paraffine, 25 gravity	.....	10 @ 11
Paraffine, 28 gravity	.....	7 1/2 @ 8
Paraffine, red	.....	7 1/2 @ 10 1/2

**Paints and Colors—**

Barytes, Foreign, ton	.....	\$22.00
Barytes, Amer. floated	.....	\$20.00
Barytes, Amer. No. 1	.....	\$16.00
Barytes, Amer. No. 2	.....	\$13.00
Barytes, Amer. No. 3	.....	\$11.00
Blue, Celestial	.....	6 @ 8
Blue, Chinese	.....	40 @ 50
Blue, Prussian	.....	25 @ 40
Blue, Ultramarine	.....	8 @ 25
Brown, Spanish	.....	3 1/2 @ 3 1/2
Brown, Vandyke	.....	6 @ 8
Brown, Van Dyke	.....	6 @ 8
Carmine, No. 40, in bulk	.....	2.75 @ ..
Carmine, No. 40, in boxes or barrels	.....	2.85 @ ..
Carmine, No. 40, in ounce bottles	.....	3.75 @ ..
Chalk, in bulk	.....	2.40 @ 2.50
Chalk, in bbls.	.....	33 @ 40
China Clay, English	.....	10 @ 18.00
Cobalt Oxide, prep'd	.....	9.00 @ 11.00
Cobalt Oxide, black	.....	1.90 @ ..
Cobalt Oxide, black, less 100 lb.	.....	1.90 @ ..
Green, Paris, in bulk	.....	10 @ 10 1/2
Green, Paris, 170 @ 175 lb.	.....	10 @ 11
Green, Paris, small pack	.....	12 @ 17
Green, Chrome, ordinary	.....	6 @ 12
Green, Chrome, pure	.....	22 @ 25
Lead, Eng. B.B. white	.....	8 1/2 @ 10
Lead, Ann. White, dry or in oil	.....	7 @ 7 1/2
Kegs, lots less than 500 lb.	.....	6 1/2 @ 6 1/2
Kegs, lots 500 lb. to 5 tons	.....	6 1/2 @ 6 1/2
Kegs, lots 5 tons to 12 tons	.....	6 1/2 @ 6 1/2
Kegs, lots 12 tons and over	.....	6 1/2 @ 6 1/2
Lead, White, in oil, 25 lb tin pails, add to keg price	.....	.. @ ..
Lead, White, in oil, 12 1/2 lb tin pails, add to keg price	.....	.. @ ..
Lead, White, in oil, 1 to 5 lb as-sorted tins, add to keg price	.....	.. @ ..
Lead, Red, bbls. and 1/2 bbls.	.....	6 @ 7 1/2
Lead, Red, kegs	.....	6 1/2 @ 7 1/2
Litharge, kegs	.....	6 1/2 @ 7 1/2
Litharge, bbls. and 1/2 bbls.	.....	6 @ 7

TERMS, &c.—Lead and Litharge—On lots of 500 lb. or over, 60 days' time or 2% discount for cash if paid within 15 days of date of invoice.

Ocher, Rochelle	.....	1.35 @ 1 1/2
Ocher, French Washed	.....	1 1/2 @ 2 1/2
Ocher, German Washed	.....	1 1/2 @ 3
Ocher, American	.....	1 1/2 @ 3 1/2
Orange Mineral, English	.....	10 @ 10 1/2
Orange Mineral, French	.....	8 1/2 @ 9
Orange Mineral, German	.....	8 1/2 @ 9
Orange Mineral, American	.....	8 1/2 @ 9
Paris White, English Cliff	.....	1.00 @ 1.15
Paris White, American	.....	65 @ 75
Red, Indian, English	.....	5 1/2 @ 7
Red, Indian, American	.....	2 @ 6 1/2
Red, Turkey	.....	9 @ 14
Red, Tuscan	.....	9 @ 11
Red, Venetian, American	.....	100 lb. 1.00 @ 1.10
Red, Venetian, English	.....	1.20 @ 1.35
Sienna, Italian, Burnt and Powd.	.....	4 @ 5
Sienna, Ital., Burnt Lumps	.....	1 1/2 @ 3 1/2
Sienna, Ital., Raw, Powd.	.....	4 1/2 @ 5 1/2
Sienna, Ital., Raw, Lumps	.....	1 1/2 @ 3 1/2
Sienna, American, Raw	.....	1 1/2 @ 1 1/2
Sienna, American, Burnt and Powdered	.....	1 1/2 @ 1 1/2
Talc, American	.....	1 1/2 @ 1 1/2
Terra Alba, Fr'ch. 100 lb	.....	95 @ 1.25
Terra Alba, English	.....	70 @ 80
Terra Alba, American No. 1	.....	65 @ 75
Terra Alba, American No. 2	.....	45 @ 50
Umber, Turkey, Burnt and Powdered	.....	3 1/2 @ 4
Umber, Turkey Bnt. Ln.	.....	2 1/2 @ 3
Umber, Turkey, Raw and Powdered	.....	3 1/2 @ 4
Umber, Turkey, R'w Lumps	.....	2 1/2 @ 3 1/2
Umber, Turkey, Bnt. Amer.	.....	1 1/2 @ 1 1/2
Umber, Turkey, R'w Amer.	.....	1 1/2 @ 1 1/2
Yellow, Chrome	.....	10 @ 12
Vermilion, American Lead	.....	11 1/2 @ 15
Vermilion, Quicks' er, bulk	.....	57 @ ..
Vermilion, Quicks' er, bags	.....	58 @ ..
Vermilion, Quicksilver sm'r	.....	62 @ ..
Vermilion, English Import	.....	85 @ 90
Vermilion, Imitation, Eng.	.....	8 @ 35
Vermilion, Trieste	.....	90 @ 92 1/2
Vermilion, Chinese	.....	92 1/2 @ 95 1/2
Whiting Common, 100 lb	.....	37 1/2 @ 42 1/2
Whiting Gilders	.....	45 @ 55

Zinc, American, dry	.....	4 1/2 @ ..
Zinc, French, Red Seal	.....	7 1/2 @ ..
Zinc, French, Green Seal	.....	9 @ ..
Zinc, French, V. M. X.	.....	7 @ ..
Zinc, Antwerp, Red Seal	.....	7 1/2 @ ..
Zinc, Antwerp, Green Seal	.....	7 1/2 @ ..
Zinc, German, L. Z. O.	.....	6 1/2 @ 7 1/2
Zinc, V. M. in Poppy Oil, G. Seal, lots of 1 ton and over	.....	10 1/2 @ 11 1/2
lots less than one ton	.....	11 @ 11 1/2
Zinc, V. M. in Poppy Oil, Red Seal	.....	10 @ 10 1/2
lots of 1 ton and over	.....	10 @ 10 1/2
lots less than 1 ton	.....	10 1/2 @ 10 1/2
Discounts—French Zinc—Discounts to buyers of 10 bbl. lots of one or assorted grades, 1 1/2; 25 bbls., 2 1/2; 50 bbls., 4 1/2. No discount allowed on less than bbl. lots.	.....	.....

**Colors in Oil—**

Black, Drop, Frankfort	.....	25 @ 30
Black, Drop, English	.....	12 @ 15
Black, Drop, Domestic	.....	7 @ 10
Black, Lampblack, Best	.....	20 @ 35
Black, Lampblack, Common	.....	7 @ 18
Black, Ivory	.....	8 @ 15
Blue, Chinese	.....	35 @ 40
Blue, Prussian	.....	20 @ 45
Blue, Ultramarine	.....	12 @ 18
Brown, Vandyke	.....	7 @ 12
Green, Chrome	.....	8 @ 13
Green, Paris	.....	16 @ 18 1/2
Sienna, Raw	.....	7 @ 14
Sienna, Burnt	.....	7 @ 14
Umber, Raw	.....	7 @ 10
Umber, Burnt	.....	7 @ 10

**Putty—**

In barrels and 1/2 bbls.	.....	.01 1/2 @ .01 1/2
In tubs	.....	.01 1/2 @ .01 1/2
In tin cans	.....	.01 1/2 @ .02 1/2
In bladders	.....	.01 1/2 @ .02 1/2

**Spirits Turpentine—**

In regular bbls.	.....	@ 29 1/2
In machine bbls.	.....	@ 30

**Glue—**

Low Grade	.....	8 @ 10
Cabinet	.....	12 @ 14
Medium White	.....	13 @ 15
Extra White	.....	17 @ 20
French	.....	10 @ 22
English	.....	10 @ 15
Irish	.....	12 @ ..

# THE IRON AGE.

The oldest paper in the world devoted to the interests of the Hardware, Iron and Metal Trades, and a standard authority on all matters relating to those branches of industry.

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